GaussDB

MySQL Compatibility(Distributed)

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Huawei Cloud Computing Technologies Co., Ltd.

Address: Huawei Cloud Data Center Jiaoxinggong Road
Qianzhong Avenue
Gui'an New District
Gui Zhou 550029
People's Republic of China

Website: https://www.huaweicloud.com/intl/en-us/

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1 Overview

This document compares GaussDB (MySQL-compatible mode and M-compatible mode) with MySQL 5.7. **MySQL Compatibility in MySQL-Compatible Mode** describes the MySQL compatibility in MySQL-compatible mode, and **MySQL Compatibility in M-compatible Mode** describes the MySQL compatibility in M-compatible mode.

2 MySQL Compatibility in MySQL-Compatible Mode

2.1 MySQL Compatibility Overview

This document compares the MySQL 5.7 compatibility mode in GaussDB (that is, when **sql_compatibility** is set to **'B'**, **b_format_version** is set to **'5.7'**, and **b_format_dev_version** is set to **'s1'**) with MySQL 5.7. Only compatibility features added later than GaussDB Kernel 503.0.0 are described. You are advised to view the specifications and restrictions of the features in *Developer Guide*.

GaussDB is compatible with MySQL in terms of data types, SQL functions, and database objects.

The underlying framework implementation of the GaussDB is different from that of MySQL. Therefore, there are still some differences between GaussDB and MySQL.

2.2 Data Types

The data types of GaussDB are the same as those of MySQL in most function scenarios, but there are some differences.

- Unless otherwise specified, the precision, scale, and number of bits of some data types cannot be defined as floating-point values. You are advised to use valid integer values.

2.2.1 Numeric Data Types

Table 2-1 Integer types

No.	MySQL	GaussDB	Difference
1	BOOL	Not fully compatible	MySQL: The BOOL/BOOLEAN type is actually mapped to the TINYINT type. GaussDB: BOOL is supported. ● Valid literal values for the "true" state include: **TRUE**, **'t'**, **'true'**, **'y'**, **'yes'**, **'1'**, **'TRUE'**, **true**, **'on'**, and all non-zero values. ● Valid literal values for the "false" state include: **FALSE**, **'f'**, **'false'**, **'n'**, **'no'**, **'0'**, **0**, **'FALSE'**, **false**, and **'off'**. **TRUE** and **FALSE** are standard expressions, compatible with SQL statements.
2	BOOLEAN	Not fully compatible	
3	TINYINT[(M)] [UNSIGNED]	Supported.	For details, see the following note.
4	SMALLINT[(M)] [UNSIGNED]	Supported.	For details, see the following note.
5	MEDIUMINT[(M)] [UNSIGNED]	Supported.	MySQL requires 3 bytes to store MEDIUMINT data. ● The signed range is –8388608 to +8388607. ● The unsigned range is 0 to +16777215. GaussDB maps data to the INT type and requires 4 bytes for storage. ● The signed range is –2147483648 to +2147483647. ● The unsigned range is 0 to +4294967295. For other differences, see the following note.
6	INT[(M)] [UNSIGNED]	Supported.	For details, see the following note.
7	INTEGER[(M)] [UNSIGNED]	Supported.	For details, see the following note.

No.	MySQL	GaussDB	Difference
8	BIGINT[(M)] [UNSIGNED]	Supported.	For details, see the following note.

NOTE

- Input formats:
  - MySQL

    For characters such as "asbd", "12dd", and "12 12", the system truncates them or returns 0 and reports a WARNING message. Data fails to be inserted into a table in strict mode.
  - GaussDB
    - For integer types (TINYINT, SMALLINT, MEDIUMINT, INT, INTEGER, and BIGINT), if the invalid part of a character string is truncated, for example, "12@3", no message is displayed. Data is successfully inserted into a table.
    - If the whole integer is truncated (for example, "@123") or the character string is empty, 0 is returned and data is successfully inserted into a table.
- Operators:
  - +, -, and *

    GaussDB: When INT, INTEGER, SMALLINT, or BIGINT is used for calculation, a value of the original type is returned and is not changed to a larger type. If the return value exceeds the range, an error is reported.

    MySQL: The value can be changed to BIGINT for calculation.
  - |, &, ^, and ~

    GaussDB: The value is calculated in the bits occupied by the type. In GaussDB, ^ indicates the exponentiation operation. If the XOR operator is required, replace it with #.

    MYSQL: The value is changed to a larger type for calculation.
- Type conversion of negative numbers:

  GaussDB: The result is **0** in loose mode and an error is reported in strict mode.

  MySQL: The most significant bit is replaced with a numeric bit based on the corresponding binary value, for example, (-1)::uint4 = 4294967295.
- Other differences:

  The precision of INT[(M)] controls formatted output in MySQL. GaussDB supports only the syntax but does not support the function.
- Aggregate function:
  - variance: indicates the sample variance in GaussDB and the population variance in MySQL.
  - stddev: indicates the sample standard deviation in GaussDB and the overall standard deviation in MySQL.
- Display width:
  - If **ZEROFILL** is not specified when the width information is specified for an integer column, the width information is not displayed in the table structure description.
  - When the INSERT statement is used to insert a column of the character type, GaussDB pads 0s before inserting the column.
  - The JOIN USING statement involves type derivation. In MySQL, the first table column is used by default. In GaussDB, if the result is of the signed type, the width information is invalid. Otherwise, the width of the first table column is used.
  - For GREATEST/LEAST, IFNULL/IF, and CASE WHEN/DECODE, MySQL does not pad 0s. In GaussDB, 0s are padded when the type and width information is consistent.
  - MySQL supports this function when it is used as the input or output parameter or return value of a function or stored procedure. GaussDB neither reports syntax errors nor supports this function.

Table 2-2 Arbitrary precision types

No.	MySQL	GaussDB	Difference
1	DECIMAL[(M[,D])]	Supported.	• Operator: In GaussDB, "^" indicates the exponentiation operation. If the XOR operator is required, replace it with "#". In MySQL, "^" indicates the XOR operation. • Value range: The precision **M** and scale **D** support only integers and do not support floating-point values. • Input format: No error is reported when all input parameters of a character string (for example, '@123') are truncated. An error is reported only when it is partially truncated, for example, '12@3'.
2	NUMERIC[(M[,D])]	Supported.	
3	DEC[(M[,D])]	Supported.	
4	FIXED[(M[,D])]	Not supported	-

Table 2-3 Floating-point types

No.	MySQL	GaussDB	Difference
1	FLOAT[(M,D)]	Supported.	• Partitioned table: The FLOAT data type does not support partitioned tables with the key partitioning policy. • Operator: In GaussDB, "^" indicates the exponentiation operation. If the XOR operator is required, replace it with "#". In MySQL, "^" indicates the XOR operation. • Value range: The precision **M** and scale **D** support only integers and do not support floating-point values. • Output format: An ERROR message is reported for invalid input parameters. No WARNING is reported in loose mode (that is, **sql_mode** is set to **''**).

No.	MySQL	GaussDB	Difference
2	FLOAT(p)	Supported.	• Partitioned table: The FLOAT data type does not support partitioned tables with the key partitioning policy. • Operator: The ^ operator is used for the numeric types, which is different from that in MySQL. In GaussDB, the ^ operator is used for exponential calculation. • Value range: When the precision **p** is defined, only valid integer data types are supported. • Output format: An ERROR message is reported for invalid input parameters. No WARNING is reported in loose mode (that is, **sql_mode** is set to '').
3	DOUBLE[(M,D)]	Supported.	• Partitioned table: The DOUBLE data type does not support partitioned tables with the key partitioning policy. • Operator: In GaussDB, "^" indicates the exponentiation operation. If the XOR operator is required, replace it with "#". In MySQL, "^" indicates the XOR operation. • Value range: The precision **M** and scale **D** support only integers and do not support floating-point values. • Output format: An ERROR message is reported for invalid input parameters. No WARNING is reported in loose mode (that is, **sql_mode** is set to '').
4	DOUBLE PRECISION[(M,D)]	Supported.	• Operator: In GaussDB, "^" indicates the exponentiation operation. If the XOR operator is required, replace it with "#". In MySQL, "^" indicates the XOR operation. • Value range: The precision **M** and scale **D** support only integers and do not support floating-point values. • Output format: An ERROR message is reported for invalid input parameters. No WARNING is reported in loose mode (that is, **sql_mode** is set to '').

No.	MySQL	GaussDB	Difference
5	REAL[(M,D)]	Supported.	• Partitioned table: The REAL data type does not support partitioned tables with the key partitioning policy. • Operator: In GaussDB, "^" indicates the exponentiation operation. If the XOR operator is required, replace it with "#". In MySQL, "^" indicates the XOR operation. • Value range: The precision **M** and scale **D** support only integers and do not support floating-point values. • Output format: An ERROR message is reported for invalid input parameters. No WARNING is reported in loose mode (that is, **sql_mode** is set to **''**).

Table 2-4 Sequential integers

<table>
<tr><th>No.</th><th>MySQL</th><th>GaussDB</th><th>Difference</th></tr>
<tr><td>1</td><td>SERIAL</td><td>Not fully compatible</td><td>For details about SERIAL in GaussDB, see "Numeric Data Types" in Developer Guide.

The differences in specifications are as follows:
CREATE TABLE test(f1 serial, f2 CHAR(20));

● The SERIAL of MySQL is mapped to BIGINT(20) UNSIGNED NOT NULL AUTO_INCREMENT UNIQUE, and the SERIAL of GaussDB is mapped to INTEGER NOT NULL DEFAULT nextval('test_f1_seq'::regclass). For example:
-- Definition of MySQL SERIAL:
mysql> SHOW CREATE TABLE test\G
*************************** 1. row ***************************
       Table: test
Create Table: CREATE TABLE `test` (
  `f1` bigint(20) unsigned NOT NULL AUTO_INCREMENT,
  `f2` char(20) DEFAULT NULL,
  UNIQUE KEY `f1` (`f1`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8
1 row in set (0.00 sec)

-- Definition of GaussDB SERIAL
gaussdb=# \d+ test
                                     Table "public.test"
 Column | Type | Modifiers | Storage | Stats target | Description
--------+---------------+--+----------+--------------+-------------
 f1 | integer | not null default nextval('test_f1_seq'::regclass) | plain | |
 f2 | character(20) | | extended | |
Has OIDs: no
Options: orientation=row, compression=no, storage_type=USTORE

● The default values of the SERIAL type in the INSERT scenario are different. For example:
-- The inserted default value of the SERIAL type in MySQL
mysql> INSERT INTO test VALUES(DEFAULT, 'aaaa');
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO test VALUES(10, 'aaaa');
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO test VALUES(DEFAULT, 'aaaa');
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM test;
+----+------+
| f1 | f2 |
+----+------+</td></tr>
</table>

No.	MySQL	GaussDB	Difference

```
|  1 | aaaa |
| 10 | aaaa |
| 11 | aaaa |
+----+------+
3 rows in set (0.00 sec)

-- The inserted default value of the SERIAL type in
GaussDB
gaussdb=# INSERT INTO test VALUES(DEFAULT,
'aaaa');
INSERT 0 1
gaussdb=# INSERT INTO test VALUES(10, 'aaaa');
INSERT 0 1
gaussdb=# INSERT INTO test VALUES(DEFAULT,
'aaaa');
INSERT 0 1
gaussdb=# SELECT * FROM test;
 f1 |          f2
----+----------------------
  1 | aaaa
  2 | aaaa
 10 | aaaa
(3 rows)
```

- The reference columns of the SERIAL type in the REPLACE scenario are different. For details about the GaussDB reference columns, see section "REPLACE" in *Developer Guide* of GaussDB. For example:

```
-- The inserted reference column value of the SERIAL
type in MySQL
mysql> REPLACE INTO test VALUES(f1, 'aaaa');
Query OK, 1 row affected (0.00 sec)

mysql> REPLACE INTO test VALUES(f1, 'bbbb');
Query OK, 1 row affected (0.00 sec)

mysql> SELECT * FROM test;
+----+------+
| f1 | f2   |
+----+------+
|  1 | aaaa |
|  2 | bbbb |
+----+------+
2 rows in set (0.00 sec)

-- The inserted reference column value of the SERIAL
type in GaussDB
gaussdb=# REPLACE INTO test VALUES(f1, 'aaaa');
REPLACE 0 1
gaussdb=# REPLACE INTO test VALUES(f1, 'bbbb');
REPLACE 0 1
gaussdb=# SELECT * FROM test;
 f1 |          f2
----+----------------------
  0 | aaaa
  0 | bbbb
(2 rows)
```


2.2.2 Date and Time Data Types

Table 2-5 Date and time data types

No.	MySQL	GaussDB	Difference
1	DATE	Supported.	GaussDB supports the date data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats – GaussDB supports only the character type and does not support the numeric type. For example, the format can be '2020-01-01' or '20200101', but cannot be 20200101. MySQL supports conversion from numeric input to the date type. – Separator: GaussDB does not support the plus sign (+) or colon (:) as the separator between the year, month, and day. Other symbols are supported. MySQL supports all symbols as separators. Sometimes, the mixed use of separators is not supported, which is different from MySQL, such as '2020-01>01' and '2020/01+01'. You are advised to use hyphens (-) or slashes (/) as separators. – No separator: You are advised to use the complete format, for example, 'YYYYMMDD' or 'YYMMDD'. The parsing rules of incomplete formats (including the ultra-long format) are different from those of MySQL. An error may be reported or the parsing result may be inconsistent with that of MySQL. Therefore, the incomplete format is not recommended. ● Output formats If the **sql_mode** parameter of GaussDB does not contain **'strict_trans_tables'** (the strict mode is used unless otherwise defined as the loose mode), the year, month, and day can be set to **0**. However, the value is converted to a valid value in the sequence of year, month, and day. For example, date '0000-00-10' is converted to 0002-12-10 BC. If the input is invalid or exceeds the range, a warning message is reported

No.	MySQL	GaussDB	Difference

			and the value **0000-00-00** is returned. MySQL outputs the date value as it is, even if the year, month, and day are set to **0**.
			● Value ranges
			The value range of GaussDB is 4713-01-01 BC to 5874897-12-31 AD. BC dates are supported. In loose mode, if the value exceeds the range, **0000-00-00** is returned. In strict mode, an error is reported. The value range of MySQL is 0000-00-00 to 9999-12-31. In loose mode, if the value exceeds the range, the performance varies in different scenarios. An error may be reported (for example, in the SELECT statement) or the value **0000-00-00** may be returned (for example, in the INSERT statement). As a result, when the date type is used as the input parameter of the function, the results returned by the function are different.
			● Operators
			– GaussDB supports only the comparison operators =, !=, <, <=, >, and >= between date types and returns **true** or **false**. For the addition operation between the date and interval types, the return result is of the date type. For the subtraction operation between the date and interval types, the return result is of the date type. For the subtraction operation between date types, the return result is of the interval type.
			– When the MySQL date type and other numeric types are calculated, the date type is converted to the numeric type, and then the calculation is performed based on the numeric type. The result is also of the numeric type. It is different from GaussDB. For example:
			`-- MySQL: date+numeric. Convert the date type to 20200101 and add it to 1. The result is 20200102.`
			`mysql> select date'2020-01-01' + 1;`
			`+----------------------+`
			`| date'2020-01-01' + 1 |`
			`+----------------------+`
			`| 20200102 |`

No.	MySQL	GaussDB	Difference
			+----------------------+ 1 row in set (0.00 sec) -- GaussDB: date+numeric. Convert the numeric type to the interval type (1 day), and then add them up to obtain a new date. gaussdb=# select date'2020-01-01' + 1; ?column? ------------ 2020-01-02 (1 row) • Type conversion Compared with MySQL, GaussDB supports conversion between the date type and char(n), nchar(n), datetime, or timestamp type, but does not support conversion between the date type and binary, decimal, JSON, integer, unsigned integer, or time type. The principles for determining common types in scenarios such as collections and complex expressions are different from those in MySQL. For details, see **Data Type Conversion**.

No.	MySQL	GaussDB	Difference
2	DATETIME[(fsp)]	Supported.	GaussDB supports the datetime data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats – GaussDB supports only the character type and does not support the numeric type. For example, '2020-01-01 10:20:30.123456' or '20200101102030.123456' is supported, but 20200101102030.123456 is not supported. MySQL supports conversion from numeric input to the datetime type. – Separator: GaussDB does not support the plus sign (+) or colon (:) as the separator between the year, month, and day. Other symbols are supported. Only colons (:) can be used as separators between hours, minutes, and seconds. Sometimes, the mixed use of separators is not supported, which is different from MySQL. Therefore, it is not recommended. MySQL supports all symbols as separators. – No separator: In GaussDB, the complete format 'YYYYMMDDhhmiss.ffffff' is recommended. The parsing rules of incomplete formats (including the ultra-long format) may be different from those of MySQL. An error may be reported or the parsing result may be inconsistent with that of MySQL. Therefore, the incomplete format is not recommended. ● Output formats: – The format is 'YYYY-MM-DD hh:mi:ss.ffffff', which is the same as that of MySQL and is not affected by the **DateStyle** parameter. However, for the precision part, if the last several digits are 0, they are not displayed in GaussDB but displayed in MySQL. – If the **sql_mode** parameter of GaussDB does not contain

No.	MySQL	GaussDB	Difference
			'strict_trans_tables' (the strict mode is used unless otherwise defined as the loose mode), the year, month, and day can be set to **0**. However, the value is converted to a valid value in the sequence of year, month, and day. For example, datetime '0000-00-10 00:00:00' is converted to 0002-12-10 00:00:00 BC. If the input is invalid or exceeds the range, a warning message is reported and the value **0000-00-00 00:00:00** is returned. MySQL outputs the datetime value as it is, even if the year, month, and day are set to **0**. ● Value ranges 4713-11-24 00:00:00.000000 BC to 294277-01-09 04:00:54.775806 AD. If the value is **294277-01-09 04:00:54.775807 AD**, **infinity** is returned. If the value exceeds the range, GaussDB reports an error in strict mode. Whether MySQL reports an error depends on the application scenario. Generally, no error is reported in the query scenario. However, an error is reported when the DML or SQL statement is executed to change the value of a table attribute. In loose mode, GaussDB returns **0000-00-00 00:00:00**. MySQL may report an error, return **0000-00-00 00:00:00**, or return **null** based on the application scenario. As a result, the execution result of the function that uses the datetime type as the input parameter is different from that of MySQL. ● Precision The value ranges from 0 to 6. For a table column, the default value is **0**, which is the same as that in MySQL. In the datetime[(p)]'str' expression, GaussDB parses **(p)** as the precision. The default value is **6**, indicating that **'str'** is formatted to the datetime type based on the precision specified by **p**. MySQL does not support the datetime[(p)]'str' expression. ● Operators

No.	MySQL	GaussDB	Difference

			– GaussDB supports only the comparison operators =, !=, <, <=, >, and >= between datetime types and returns **true** or **false**. For the addition operation between the datetime and interval types, the return result is of the datetime type. For the subtraction operation between the datetime and interval types, the return result is of the datetime type. For the subtraction operation between datetime types, the return result is of the interval type.
			– When the MySQL datetime type and other numeric types are calculated, the datetime type is converted to the numeric type, and then the calculation is performed based on the numeric type. The result is also of the numeric type. It is different from GaussDB. For example:
			`-- MySQL: datetime+numeric. Convert the datetime type to 20201010123456 and add it to 1. The result is 20201010123457.`
			`mysql> select cast('2020-10-10 12:34:56.123456' as datetime) + 1;`
			`+----------------------------------------------------+`
			`| cast('2020-10-10 12:34:56.123456' as datetime) + 1 |`
			`+----------------------------------------------------+`
			`| 20201010123457 |`
			`+----------------------------------------------------+`
			`1 row in set (0.00 sec)`
			
			`-- GaussDB: datetime+numeric. Convert the numeric type to the interval type (1 day), and then add them up to obtain the new datetime.`
			`gaussdb=# select cast('2020-10-10 12:34:56.123456' as datetime) + 1;`
			`?column?`
			`---------------------`
			`2020-10-11 12:34:56`
			`(1 row)`
			If the calculation result of the datetime type and numeric type is used as the input parameter of a function, the result of the function may be different from that of MySQL.
			• Type conversion
			Compared with MySQL, GaussDB supports only conversion between the datetime type and char(n), varchar(n), and timestamp types, and conversion from datetime to date and time types

No.	MySQL	GaussDB	Difference
			(only value assignment and explicit conversion). The conversion between the datetime type and the binary, decimal, json, integer, or unsigned integer type is not supported. The principles for determining common types in scenarios such as collections and complex expressions are different from those in MySQL. For details, see **Data Type Conversion**. • Time zones In GaussDB, the datetime value can carry the time zone information (time zone offset or time zone name), for example, '2020-01-01 12:34:56.123456 +01:00' or '2020-01-01 2:34:56.123456 CST'. GaussDB converts the time to the time of the current server time zone. MySQL 5.7 does not support this function. MySQL 8.0 and later versions support this function. • The table columns of the datetime data type in GaussDB are actually converted to the timestamp(p) without time zone. When you query the table information or use a tool to export the table structure, the data type of columns is timestamp(p) without time zone instead of datetime. For MySQL, datetime(p) is displayed.

No.	MySQL	GaussDB	Difference
3	TIMESTAMP[(fsp)]	Supported.	GaussDB supports the timestamp data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – It supports only the character type and does not support the numeric type. For example, '2020-01-01 10:20:30.123456' or '20200101102030.123456' is supported, but 20200101102030.123456 is not supported. MySQL supports conversion from numeric input to the timestamp type. – Separator: It does not support the plus sign (+) or colon (:) as the separator between the year, month, and day. Other symbols are supported. Only colons (:) can be used as separators between hours, minutes, and seconds. Sometimes, the mixed use of separators is not supported, which is different from MySQL. Therefore, it is not recommended. MySQL supports all symbols as separators. – No separator: The complete format 'YYYYMMDDhhmiss.ffffff' is recommended. The parsing rules of incomplete formats (including the ultra-long format) may be different from those of MySQL. An error may be reported or the parsing result may be inconsistent with that of MySQL. Therefore, the incomplete format is not recommended. ● Output formats: – The format is 'YYYY-MM-DD hh:mi:ss.ffffff', which is the same as that of MySQL and is not affected by the **DateStyle** parameter. However, for the precision part, if the last several digits are 0, they are not displayed in GaussDB but displayed in MySQL. – If the **sql_mode** parameter of GaussDB does not contain

No.	MySQL	GaussDB	Difference
			'strict_trans_tables' (the strict mode is used unless otherwise defined as the loose mode), the year, month, and day can be set to **0**. However, the value is converted to a valid value in the sequence of year, month, and day. For example, timestamp '0000-00-10 00:00:00' is converted to 0002-12-10 00:00:00 BC. If the input is invalid or exceeds the range, a warning message is reported and the value **0000-00-00 00:00:00** is returned. MySQL outputs the timestamp value as it is, even if the year, month, and day are set to **0**. ● Value ranges 4713-11-24 00:00:00.000000 BC to 294277-01-09 04:00:54.775806 AD. If the value is **294277-01-09 04:00:54.775807 AD**, **infinity** is returned. If the value exceeds the range, GaussDB reports an error in strict mode. Whether MySQL reports an error depends on the application scenario. Generally, no error is reported in the query scenario. However, an error is reported when the DML or SQL statement is executed to change the value of a table attribute. In loose mode, GaussDB returns **0000-00-00 00:00:00**. MySQL may report an error, return **0000-00-00 00:00:00**, or return **null** based on the application scenario. As a result, the execution result of the function that uses the timestamp type as the input parameter is different from that of MySQL. ● Precision: The value ranges from 0 to 6. For a table column, the default value is **0**, which is the same as that in MySQL. In the timestamp[(p)] 'str' expression: – GaussDB parses **(p)** as the precision. The default value is **6**, indicating that **'str'** is formatted to the timestamp type based on the precision specified by **p**. – The meaning of timestamp 'str' in MySQL is the same as that in

No.	MySQL	GaussDB	Difference

			GaussDB. The default precision is **6**. However, timestamp(p) 'str' is parsed as a function call. **p** is used as the input parameter of the timestamp function. The result returns a value of the timestamp type, and **'str'** is used as the alias of the projection column.
			● Operators
			– GaussDB supports only the comparison operators =, !=, <, <=, >, and >= between timestamp types and returns **true** or **false**. For the addition operation between the timestamp and interval types, the return result is of the timestamp type. For the subtraction operation between the timestamp and interval types, the return result is of the timestamp type. For the subtraction operation between timestamp types, the return result is of the interval type.
			– When the MySQL timestamp type and other numeric types are calculated, the timestamp type is converted to the numeric type, and then the calculation is performed based on the numeric type. The result is also of the numeric type. It is different from GaussDB. For example:
			`-- MySQL: timestamp+numeric. Convert the timestamp type to 20201010123456.123456 and add it to 1. The result is 20201010123457.123456.`
			`mysql> select timestamp '2020-10-10 12:34:56.123456' + 1;`
			`+-------------------------------------------+`
			`| timestamp '2020-10-10 12:34:56.123456' + 1 |`
			`+-------------------------------------------+`
			`| 20201010123457.123456 |`
			`+-------------------------------------------+`
			`1 row in set (0.00 sec)`
			
			`-- GaussDB: timestamp+numeric. Convert the numeric type to the interval type (1 day), and then add them up to obtain a new timestamp.`
			`gaussdb=# select timestamp '2020-10-10 12:34:56.123456' + 1;`
			`?column?`
			`----------`
			`2020-10-11 12:34:56.123456`
			`(1 row)`
			If the calculation result of the timestamp type and numeric type is used as the input parameter of a

No.	MySQL	GaussDB	Difference
			function, the result of the function may be different from that of MySQL. • Type conversion Compared with MySQL, GaussDB supports only conversion between timestamp and char(n), varchar(n), and datetime, and conversion from timestamp to date and time (only value assignment and explicit conversion). The conversion between the timestamp type and the binary, decimal, json, integer, or unsigned integer type is not supported. The principles for determining common types in scenarios such as collections and complex expressions are different from those in MySQL. For details, see **Data Type Conversion**. • Time zones In GaussDB, the timestamp value can carry the time zone information (time zone offset or time zone name), for example, '2020-01-01 12:34:56.123456 +01:00' or '2020-01-01 2:34:56.123456 CST'. GaussDB converts the time to the time of the current server time zone. If the time zone of the server is changed, the timestamp value is converted to the timestamp of the new time zone. MySQL 5.7 does not support this function. MySQL 8.0 and later versions support this function. • The table columns of the timestamp data type in GaussDB are actually converted to the timestamp(p) with time zone. When you query the table information or use a tool to export the table structure, the data type of columns is timestamp(p) with time zone instead of timestamp. For MySQL, timestamp(p) is displayed.

No.	MySQL	GaussDB	Difference
4	TIME[(fsp)]	Supported.	GaussDB supports the time data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – It supports only the character type and does not support the numeric type. For example, '1 10:20:30' or '102030' is supported, but 102030 is not supported. MySQL supports conversion from numeric input to the time type. – Separator: GaussDB supports only colons (:) as separators between hours, minutes, and seconds. MySQL supports all symbols as separators. – No separator: The complete format 'hhmiss.ffffff' is recommended. The parsing rules of incomplete formats (including the ultra-long format) may be different from those of MySQL. An error may be reported or the parsing result may be inconsistent with that of MySQL. Therefore, the incomplete format is not recommended. – When a negative value is entered for minute, second, or precision, GaussDB may ignore the first part of the negative value, which is parsed as 0. For example, '00:00:-10' is parsed as '00:00:00'. An error may also be reported. For example, if '00:00:-10000' is parsed, an error will be reported. The result depends on the range of the input value. However, MySQL reports an error in both cases. ● Output formats: The format is hh:mi:ss.ffffff, which is the same as that of MySQL. However, for the precision part, if the last several digits are 0, they are not displayed in GaussDB but displayed in MySQL. ● Value ranges –838:59:59.000000 to 838:59:59.000000, which is the same as that of MySQL. In GaussDB loose mode, if a value exceeds the range, the nearest boundary value **–838:59:59** or **838:59:59** is returned,

No.	MySQL	GaussDB	Difference

			regardless of the query or DML operations such as insert and update. In MySQL, an error is reported during query, or the nearest boundary value is returned after a DML operation. As a result, when the time type is used as the input parameter of the function, the results returned by the function are different.
			● Precision:
			The value ranges from 0 to 6. For a table column, the default value is **0**, which is the same as that in MySQL. In the time(p) 'str' expression, GaussDB parses **(p)** as the precision. The default value is **6**, indicating that **'str'** is formatted to the time type based on the precision specified by **p**. MySQL parses it as a time function, **p** is an input parameter, and **'str'** is the alias of the projection column.
			● Operators
			– GaussDB supports only the comparison operators =, !=, <, <=, >, and >= between time types and returns **true** or **false**. For the addition operation between the time and interval types, the return result is of the time type. For the subtraction operation between the time and interval types, the return result is of the time type. For the subtraction operation between time types, the return result is of the interval type.
			– When the MySQL time type and other numeric types are calculated, the time type is converted to the numeric type, and then the calculation is performed based on the numeric type. The result is also of the numeric type. It is different from GaussDB. For example:
			`-- MySQL: time+numeric. Convert the time type to 123456 and add it to 1. The result is 123457.`
			`mysql> select time '12:34:56' + 1;`
			`+----------------------+`
			`| time '12:34:56' + 1 |`
			`+----------------------+`
			`| 123457 |`
			`+----------------------+`
			`1 row in set (0.00 sec)`

No.	MySQL	GaussDB	Difference
			-- GaussDB: time+numeric. Convert the numeric type to the interval type (1 day), and then add them up to obtain the new time. Because 24 hours are added, the obtained time is still 12:34:56. gaussdb=# select time '12:34:56' + 1; ?column? ---------- 12:34:56 (1 row) If the calculation result of the time type and numeric type is used as the input parameter of a function, the result of the function may be different from that of MySQL. • Type conversion Compared with MySQL, GaussDB supports only conversion between the time type and char(n) or nchar(n) type, and conversion between the datetime or timestamp type and time type. The conversion between the time type and binary, decimal, date, JSON, integer, or unsigned integer type is not supported. The principles for determining common types in scenarios such as collections and complex expressions are different from those in MySQL. For details, see **Data Type Conversion**.

No.	MySQL	GaussDB	Difference
5	YEAR[(4)]	Supported.	GaussDB supports the year data type. Compared with MySQL, GaussDB has the following differences in specifications: • Operators – GaussDB supports only the comparison operators =, !=, <, <=, >, and >= between year types and returns **true** or **false**. – GaussDB supports only the arithmetic operators + and - between the year and int4 types and returns integer values. MySQL returns unsigned integer values. • Type conversion Compared with MySQL, GaussDB supports only the conversion between the year type and int4 type, and supports only the conversion from the int4, varchar, numeric, date, time, timestamp, or timestamptz type to the year type. The principles for determining common types in scenarios such as collections and complex expressions are different from those in MySQL. For details, see **Data Type Conversion**.

No.	MySQL	GaussDB	Difference
6	INTERVAL	Supported.	GaussDB supports the INTERVAL data type, but INTERVAL is an expression in MySQL. The differences are as follows: ● The date input of the character string type cannot be used as an operation, for example, select '2023-01-01' + interval 1 day. ● In the INTERVAL expr unit syntax, **expr** cannot be a negative integer or floating-point number, for example, select date'2023-01-01' + interval -1 day. ● In the INTERVAL expr unit syntax, **expr** cannot be the input of an operation expression, for example, select date'2023-01-01' + interval 4/2 day. ● When the INTERVAL expression is used for calculation, the return value is of the datetime type. For MySQL, the return value is of the datetime or date type. The calculation logic is the same as that of GaussDB but different from that of MySQL. ● In the INTERVAL expr unit syntax, the value range of **expr** varies with the unit. The maximum value range is [–2147483648, 2147483647]. If the value exceeds the range, an error is reported in strict mode, and a warning is reported in loose mode and **0** is returned. ● In the INTERVAL expr unit syntax, if the number of columns specified by **expr** is greater than the expected number of columns in unit, an error is reported in strict mode, and a warning is reported in loose mode and **0** is returned. For example, if the value of **unit** is **DAY_HOUR**, the expected number of columns is 2. If the value of **expr** is **'1-2-3'**, the expected number of columns is 3.

2.2.3 String Data Types

Table 2-6 String data types

No.	MySQL	GaussDB	Difference
1	CHAR[(M)]	Supported	• Input format – The length of parameters and return values of GaussDB user-defined functions cannot be verified. The length of stored procedure parameters cannot be verified. In addition, correct spaces cannot be supplemented when **PAD_CHAR_TO_FULL_LENGTH** is enabled. However, MySQL supports these functions. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Syntax The CAST(expr as char) syntax of GaussDB cannot convert the input string to the corresponding type based on the string length. It can only be converted to the varchar type. CAST('' as char) and CAST('' as char(0)) cannot convert an empty string to the char(0) type. MySQL supports conversion to the corresponding type by length. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.

No.	MySQL	GaussDB	Difference
2	VARCHAR(M)	Supported	• Input format – The length of parameters and return values of GaussDB user-defined functions cannot be verified. The length of stored procedure parameters cannot be verified. However, MySQL supports these functions. – The length of temporary variables in GaussDB user-defined functions and stored procedures can be verified, and an error or truncation alarm is reported in strict or loose mode. However, MySQL does not support these functions. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.

No.	MySQL	GaussDB	Difference
3	TINYTEXT	Supported	• Input format – The length limit in GaussDB is 1 GB, not 255 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. However, MySQL supports these functions. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.

No.	MySQL	GaussDB	Difference
4	TEXT	Supported	• Input format – The length limit in GaussDB is 1 GB, not 65535 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. However, MySQL supports these functions. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.

No.	MySQL	GaussDB	Difference
5	MEDIUMTEXT	Supported	• Input format – The length limit in GaussDB is 1 GB, not 16777215 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. However, MySQL supports these functions. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.

No.	MySQL	GaussDB	Difference
6	LONGTEXT	Supported	• Input format – GaussDB supports a maximum of 1 GB, and MySQL supports a maximum of 4 GB minus 1 byte. – GaussDB does not support escape characters or double quotation marks (""). MySQL supports these inputs. • Operator – GaussDB can convert a character string to a floating-point value and perform the modulo operation on the character string and integer value. The return value is an integer. MySQL returns a floating-point value. – If a value is divided by 0, GaussDB reports an error, and MySQL returns null. – "~": returns a negative number in GaussDB and an 8-byte unsigned integer in MySQL. – "^": indicates a power in GaussDB and a bitwise XOR in MySQL.
7	ENUM('value1','value2',...)	Not supported	-
8	SET('value1','value2',...)	Not supported	-

2.2.4 Binary Data Types

Table 2-7 Binary data types

No.	MySQL	GaussDB	Difference
1	BINARY[(M)]	Not supported	-
2	VARBINARY(M)	Not supported	-

No.	MySQL	GaussDB	Difference
3	TINYBLOB	Supported	• Value range: The value is of the BYTEA type. The length limit is 1 GB, not 255 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. • Input format: Escape characters and double quotation marks ("") are not supported. • Output format: For the '\0' character, the query result is displayed as '\000'. If the getBytes API of the JDBC driver is used, the result is the '\0' character. • Operator: Arithmetic operators (+, -, *, /, and %) are not supported. Common logical operators OR, AND, NOT (||, &&, and !) are not supported. Common bitwise operators (~, &, |, and ^) are not supported.
4	BLOB	Supported	• Value range: The value is of the BYTEA type. The length limit is 1 GB, not 65535 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. However, MySQL supports these functions. • Input format: Escape characters and double quotation marks ("") are not supported. • Output format: For the '\0' character, the query result is displayed as '\000'. If the getBytes API of the JDBC driver is used, the result is the '\0' character. • Operator: Arithmetic operators (+, -, *, /, and %) are not supported. Common logical operators OR, AND, NOT (||, &&, and !) are not supported. Common bitwise operators (~, &, |, and ^) are not supported.

No.	MySQL	GaussDB	Difference
5	MEDIUMBLOB	Supported	• Value range: The value is of the BYTEA type. The length limit is 1 GB, not 16777215 bytes. If the length exceeds the limit, no error or truncation alarm is reported in strict or loose mode. However, MySQL supports these functions. • Input format: Escape characters and double quotation marks ("") are not supported. • Output format: For the '\0' character, the query result is displayed as '\000'. If the getBytes API of the JDBC driver is used, the result is the '\0' character. • Operator: Arithmetic operators (+, -, *, /, and %) are not supported. Common logical operators OR, AND, NOT (||, &&, and !) are not supported. Common bitwise operators (~, &, |, and ^) are not supported.
6	LONGBLOB	Supported	• Value range: The value is of the BYTEA type. The upper limit is 1 GB. For details about the range, see the centralized and distributed specifications of the BYTEA data type. • Input format: Escape characters and double quotation marks ("") are not supported. • Output format: For the '\0' character, the query result is displayed as '\000'. If the getBytes API of the JDBC driver is used, the result is the '\0' character. • Operator: Arithmetic operators (+, -, *, /, and %) are not supported. Common logical operators OR, AND, NOT (||, &&, and !) are not supported. Common bitwise operators (~, &, |, and ^) are not supported.
7	BIT[(M)]	Not supported	-

2.2.5 JSON Data Type

Table 2-8 JSON data type

No.	MySQL	GaussDB
1	JSON	Not fully compatible

2.2.6 Attributes Supported by Data Types

Table 2-9 Attributes supported by data types

No.	MySQL	GaussDB
1	NULL	Supported
2	NOT NULL	Supported
3	DEFAULT	Supported
4	ON UPDATE	Supported
5	PRIMARY KEY	Supported
6	CHARACTER SET name	Supported
7	COLLATE name	Supported

2.2.7 Data Type Conversion

Conversion between different data types is supported. Data type conversion is involved in the following scenarios:

- The data types of operands of operators (such as comparison and arithmetic operators) are inconsistent. It is commonly used for comparison operations in query conditions or join conditions.
- The data types of arguments and parameters are inconsistent when a function is called.
- The data types of target columns to be updated by DML statements (including INSERT, UPDATE, MERGE, and REPLACE) and the defined column types are inconsistent.
- Explicit type conversion: cast(expr as datatype), which converts an expression to a data type.
- After the target data type of the final projection column is determined by set operations (UNION, MINUS, EXCEPT, and INTERSECT), the type of the projection column in each SELECT statement is inconsistent with the target data type.

- In other expression calculation scenarios, the target data type used for comparison or final result is determined based on the data type of different expressions.
  - DECODE
  - CASE WHEN
  - lexpr [NOT] IN (expr_list)
  - BETWEEN AND
  - JOIN USING(a,b)
  - GREATEST and LEAST
  - NVL and COALESCE

GaussDB and MySQL have different rules for data type conversion and target data types. The following examples show the differences between the two processing modes:

```
-- MySQL: The execution result of IN is 0, indicating false. According to the rule, '1970-01-01' is compared with the expressions in the list in sequence. The results are all 0s. Therefore, the final result is 0.
mysql> select '1970-01-01' in ('1970-01-02', 1, '1970-01-02');
+-------------------------------------------------+
| '1970-01-01' in ('1970-01-02', 1, '1970-01-02') |
+-------------------------------------------------+
|                                               0 |
+-------------------------------------------------+

-- GaussDB: The execution result of IN is true, which is opposite to the MySQL result. The common type selected based on the rule is int. Therefore, the left expression '1970-01-01' is converted to the int type and compared with the value after the expression in the list is converted to the int type.
-- When '1970-01-01' and '1970-01-02' are converted to the int type, the values are 1970. (In MySQL-compatible mode, invalid characters and the following content are ignored during conversion, and the previous part is converted to the int type.) The comparison result is equal. Therefore, the returned result is true.
gaussdb=# select '1970-01-01' in ('1970-01-02', 1::int, '1970-01-02') as result;
 result
--------
 t
(1 row)
```

1. Differences in data type conversion rules:

- The GaussDB clearly defines the conversion rules between different data types.
  - Whether to support conversion: Conversion is supported only when the conversion path of two types is defined in the pg_cast system catalog.
  - Conversion scenarios: conversion in any scenario, conversion only in CAST expressions, and conversion only during value assignment. In scenarios that are not supported, data type conversion cannot be performed even if the conversion path is defined.
- MySQL supports conversion between any two data types.

Due to the preceding differences, when MySQL-based applications are migrated to GaussDB, an error may be reported because the SQL statement does not support the conversion between different data types. In the scenario where conversion is supported, different conversion rules result in different execution results of SQL statements.

You are advised to use the same data type in SQL statements for comparison or value assignment to avoid unexpected results or performance loss caused by data type conversion.

2. Differences in target data type selection rules:

In some scenarios, the data type to be compared or returned can be determined only after the types of multiple expressions are considered. For example, in the UNION operation, projection columns at the same position in different SELECT statements are of different data types. The final data type of the query result needs to be determined based on the data type of the projection columns in each SELECT statement.

GaussDB and MySQL have different rules for determining the target data types.

- GaussDB rules:
  - If the operand types of operators are inconsistent, the operand types are not converted to the target type before calculation. Instead, operators of two data types are directly registered, and two types of processing rules are defined during operator processing. In this mode, implicit type conversion does not exist, but the customized processing rule implies the conversion operation.
  - Rules for determining the target data type in the set operation and expression scenarios:
    - If all types are the same, it is the target type.
    - If the two data types are different, check whether the data types are of the same type, such as the numeric type, character type, and date and time type. If they do not belong to the same type, the target type cannot be determined. In this case, an error is reported during SQL statement execution.
    - For data types with the same **category** attribute (defined in the pg_type system catalog), the data type with the **preferred** attribute (defined in the pg_type system catalog) is selected as the target type. If operand 1 can be converted to operand 2 (no conversion path), but operand 2 cannot be converted to operand 1 or the priority of the numeric type is lower than that of operand 2, then operand 2 is selected as the target type.
    - If three or more data types are involved, the rule for determining the target type is as follows: common_type(type1,type2,type3) = common_type(common_type(type1,type2),type3). Perform iterative processing in sequence to obtain the final result.
    - For IN and NOT IN expressions, if the target type cannot be determined based on the preceding rules, each expression in **lexpr** and **expr_list** is compared one by one based on the equivalent operator (=).
    - Precision determination: The precision of the finally selected expression is used as the final result.
- MySQL rules:

- If the operand types of operators are inconsistent, determine the target type based on the following rules. Then, convert the inconsistent operand types to the target type and then process the operands.
  - If both parameters are of the string type, they are compared based on the string type.
  - If both parameters are of the integer type, they are compared based on the integer type.
  - If a hexadecimal value is not compared with a numeric value, they are compared based on the binary string.
  - If one parameter is of the datetime/timestamp type, and the other parameter is a constant, the constant is converted to the timestamp type for comparison.
  - If one parameter is of the decimal type, the data type used for comparison depends on the other parameter. If the other type is decimal or integer, the decimal type is used. If the other type is not decimal, the real type is used.
  - In other scenarios, the data type is converted to the real type for comparison.
- Rules for determining the target data type in the set operation and expression scenarios:
  - Establish a target type matrix between any two types. Given two types, the target type can be determined by using the matrix.
  - If three or more data types are involved, the rule for determining the target type is as follows: common_type(type1,type2,type3) = common_type(common_type(type1,type2),type3). Perform iterative processing in sequence to obtain the final result.
  - If the target type is integer and each expression type contains signed and unsigned integers, the type is promoted to an integer type with higher precision. The result is unsigned only when all expressions are unsigned. Otherwise, the result is signed.
  - The highest precision in the expression is used as the final result.

According to the preceding rules, GaussDB and MySQL differ greatly in data type conversion rules and types cannot be directly compared. In the preceding scenario, the execution result of SQL statements may be different from that in MySQL. In the current version, you are advised to use the same type for all expressions or use CAST to convert the type to the required type in advance to avoid differences.

2.3 System Functions

GaussDB is compatible with most MySQL system functions, but there are some differences. If not listed, the function behavior is the native GaussDB behavior by default.

2.3.1 Flow Control Functions

Table 2-10 Flow control functions

No.	MySQL	GaussDB	Difference
1	IF()	Supported	• The **expr1** input parameter supports only the Boolean type. If an input parameter of the non-Boolean type cannot be converted to the Boolean type, an error is reported. • If the types of **expr2** and **expr3** are different and no implicit conversion function exists between the two types, an error is reported. • If the two input parameters are of the same type, the input parameter type is returned. • If the **expr2** and **expr3** input parameters are of the NUMERIC, STRING, or TIME type respectively, the output is of the TEXT type. In MySQL, the output is of the VARCHAR type.
2	IFNULL()	Supported	• If the types of **expr1** and **expr2** are different and no implicit conversion function exists between the two types, an error is reported. • If the two input parameters are of the same type, the input parameter type is returned. • If the **expr1** and **expr2** input parameters are of the NUMERIC, STRING, or TIME type respectively, the output is of the TEXT type. In MySQL, the output is of the VARCHAR type. • If one input parameter is of the FLOAT4 type and the other is of any type in the numeric category, the return type is DOUBLE. In MySQL, if one input parameter is of FLOAT4 type and the other input parameter is of the TINYINT, UNSIGNED TINYINT, SMALLINT, UNSIGNED SMALLINT, MEDIUMINT, UNSIGNED MEDIUMINT, or BOOL type, the FLOAT4 type is returned. If the first input parameter is of FLOAT4 type and the second input parameter is of BIGINT or UNSIGNED BIGINT type, the FLOAT type is returned.

No.	MySQL	GaussDB	Difference

3	NULLIF()	Supported	• The NULLIF() type derivation in GaussDB complies with the following logic:
			1. If the data types of two parameters are different and the two input parameter types have an equality comparison operator, the left value type corresponding to the equality comparison operator is returned. Otherwise, the two input parameter types are forcibly compatible.
			2. If an equality comparison operator exists after forcible type compatibility, the left value type of the equality comparison operator after forcible type compatibility is returned.
			3. If the corresponding equality operator cannot be found after forcible type compatibility, an error is reported.
			-- The two input parameter types have an equality comparison operator.
			gaussdb=# select pg_typeof(nullif(1::int2, 2::int8));
			pg_typeof
			----------- 	
			smallint
			(1 row)
			-- The two input parameter types do not have the equality comparison operator, but the equality comparison operator can be found after forcible type compatibility.
			gaussdb=# select pg_typeof(nullif(1::int1, 2::int2));
			pg_typeof
			----------- 	
			bigint
			(1 row)
			
			-- The two input parameter types do not have the equality comparison operator, and the equality comparison operator does not exist after forcible type compatibility.
			gaussdb=# SELECT nullif(1::bit, '1'::MONEY);
			ERROR: operator does not exist: bit = money
			LINE 1: SELECT nullif(1::bit, '1'::MONEY);
			^
			HINT: No operator matches the given name and argument type(s). You might need to add explicit type casts.
			CONTEXT: referenced column: nullif
			• The MySQL output type is related only to the type of the first input parameter.
			1. If the type of the first input parameter is TINYINT, SMALLINT, MEDIUMINT, INT, or BOOL, the output is of the INT type.
			2. If the type of the first input parameter is BIGINT, the output is of the BIGINT type.
			3. When the type of the first input parameter is UNSIGNED TINYINT, UNSIGNED SMALLINT, UNSIGNED MEDIUMINT, UNSIGNED INT, or BIT, the output is of the UNSIGNED INT type.

No.	MySQL	GaussDB	Difference
			4. If the type of the first input parameter is UNSIGNED BIGINT, the output is of the UNSIGNED BIGINT type. 5. If the type of the first input parameter is FLOAT, DOUBLE, or REAL, the output is of the DOUBLE type. 6. If the type of the first input parameter DECIMAL or NUMERIC, the output is of the DECIMAL type. 7. If the type of the first input parameter is DATE, TIME, DATE, DATETIME, TIMESTAMP, CHAR, VARCHAR, TINYTEXT, ENUM, or SET, the output is of the VARCHAR type. 8. If the type of the first input parameter is TEXT, MEDIUMTEXT, or LONGTEXT, the output is of the LONGTEXT type. 9. If the type of the first input parameter is TINYBLOB, the output is of the VARBINARY type. 10. If the type of the first input parameter is MEDIUMBLOB or LONGBLOB, the output is of the LONGBLOB type. 11. If the type of the first input parameter is BLOB, the output is of the BLOB type.
4	ISNULL()	Supported	In GaussDB, the return value is **t** or **f** of the BOOLEAN type. In MySQL, the return value is **1** or **0** of the INT type.

2.3.2 Date and Time Functions

NOTE

The following describes the date and time function compatibility between GaussDB and MySQL:

- In *Developer Guide*, if an input parameter of a function is a time expression:

Time expressions include text, datetime, date, and time. All types that can be implicitly converted to time expressions can be used as input parameters. For example, a number can be implicitly converted to text and then used as a time expression.

However, the effective mode varies according to the function. For example, datediff is used to calculate only the date difference. Therefore, the time expression is parsed as date. timestampdiff is used to calculate the time difference based on the unit. Therefore, the time expression is parsed as date, time, or datetime based on the unit.

- If an input parameter of a function is an invalid date:

Generally, the supported date and datetime ranges are the same as those of MySQL. The value of date ranges from '0000-01-01' to '9999-12-31', and the value of datetime ranges from '0000-01-01 00:00:00' to '9999-12-31 23:59:59'. Although the date and datetime ranges supported by GaussDB are greater than those supported by MySQL, out-of-bound dates are still invalid.

Most time functions generate alarms and return NULL. Only dates that can be normally converted by CAST are normal and reasonable dates.

- Separators for input parameters of functions:

  For a time function, all non-digit characters are regarded as separators when input parameters are processed. The standard format is recommended: Use hyphens (-) to separate year, month, and day, use colons (:) to separate hour, minute, and second, and use a period (.) before milliseconds.

  Error-prone scenario: "SELECT timestampdiff(hour, '2020-03-01 00:00:00', '2020-02-28 00:00:00+08');" In B-compatible databases, the time zone in a time function is not automatically calculated. Therefore, +08 is not identified as the time zone. Instead, + is used as a separator and is calculated as seconds.

Most function scenarios of GaussDB date and time functions are the same as those of MySQL, but there are still differences. Some differences are as follows:

- If an input parameter of a function is NULL, the function returns NULL, and no warning or error is reported. These functions include:

  from_days, date_format, str_to_date, datediff, timestampdiff, date_add, subtime, month, time_to_sec, to_days, to_seconds, dayname, monthname, convert_tz, sec_to_time, addtime, adddate, date_sub, timediff, last_day, weekday, from_unixtime, unix_timestamp, subdate, day, year, weekofyear, dayofmonth, dayofyear, week, yearweek, dayofweek, time_format, hour, minute, second, microsecond, quarter, get_format, extract, makedate, period_add, timestampadd, period_diff, utc_time, utc_timestamp, maketime, and curtime.

  Example:

```
gaussdb=# select day(null);
 day
-----

(1 row)
```

- Some functions with pure numeric input parameters are different from those of MySQL. Numeric input parameters without quotation marks are converted into text input parameters for processing.

  Example:


```
gaussdb=# select day(19231221.123141);
WARNING:  Incorrect datetime value: "19231221.123141"
CONTEXT:  referenced column: day
 day
-----

(1 row)
```

- Time and date calculation functions are adddate, subdate, date_add, and date_sub. If the calculation result is a date, the supported range is [0000-01-01,9999-12-31]. If the calculation result is a date and time, the supported range is [0000-01-01 00:00:00.000000,9999-12-31 23:59:59.999999]. If the calculation result exceeds the supported range, an ERROR is reported in strict mode, or a WARNING is reported in loose mode. If the date result after calculation is within the range [0000-01-01,0001-01-01], GaussDB returns the result normally. MySQL returns '0000-00-00'.

  Example:

```
gaussdb=# SELECT subdate('0000-01-01', interval 1 hour);
ERROR:  Datetime function: datetime field overflow
CONTEXT:  referenced column: subdate

gaussdb=# SELECT subdate('0001-01-01', interval 1 day);
   subdate
-------------
 0000-12-31

(1 row)
```

- If the input parameter of the date or datetime type of the date and time function contains month 0 or day 0, the value is invalid. In strict mode, an error is reported. In loose mode, if the input is a character string or number, a warning is reported. If the input is of the date or datetime type, the system processes the input as December of the previous year or the last day of the previous month.

  If the type of the CAST function is converted to date or datetime, an error is reported in strict mode. In loose mode, no warning is reported. Instead, the system processes the input as December of the previous year or the last day of the previous month. Pay attention to this difference. MySQL outputs the value as it is, even if the year, month, and day are set to **0**.

  Example:

```
gaussdb=# select adddate('2023-01-00', 1);-- Strict mode
ERROR:  Incorrect datetime value: "2023-01-00"
CONTEXT:  referenced column: adddate

gaussdb=# select adddate('2023-01-00', 1);-- Loose mode
WARNING:  Incorrect datetime value: "2023-01-00"
CONTEXT:  referenced column: adddate
 adddate
---------

(1 row)

gaussdb=# select adddate(date'2023-00-00', 1);-- Loose mode
  adddate
------------
 2022-12-01
(1 row)

gaussdb=# select cast('2023/00/00' as date);-- Loose mode
    date
------------
 2022-11-30
(1 row)
```



```
gaussdb=# select cast('0000-00-00' as datetime);-- Loose mode
      timestamp
---------------------
 0000-00-00 00:00:00
(1 row)
```

- If the input parameter of the function is of the numeric data type, no error is reported in the case of invalid input, and the input parameter is processed as 0.

  Example:

  ```
  gaussdb=# select from_unixtime('aa');
     from_unixtime
  ---------------------
   1970-01-01 08:00:00
  (1 row)
  ```

- A maximum of six decimal places are allowed. Decimal places with all 0s are not allowed.

  Example:

  ```
  gaussdb=# select from_unixtime('1234567899.00000');
     from_unixtime
  ---------------------
   2009-02-14 07:31:39
  (1 row)
  ```

- If the time function parameter is a character string, the result is correct only when the year, month, and day are separated by a hyphen (-) and the hour, minute, and second are separated by a colon (:).

  Example:

  ```
  gaussdb=# select adddate('20-12-12',interval 1 day);
    adddate
  ------------
   2020-12-13
  (1 row)
  ```

- If the return value of a function is of the varchar type in MySQL, the return value of the function is of the text type in GaussDB.

  ```
  -- Return value of a function in GaussDB.
  gaussdb=#  SELECT pg_typeof(adddate('2023-01-01', 1));
   pg_typeof
  -----------
   text
  (1 row)

  -- Return value of a function in MySQL.
  mysql> CREATE VIEW v1 AS SELECT adddate('2023-01-01', 1);
  Query OK, 0 rows affected (0.00 sec)

  mysql> DESC v1;
  +--------------------------+-------------+------+-----+---------+-------+
  | Field                    | Type        | Null | Key | Default | Extra |
  +--------------------------+-------------+------+-----+---------+-------+
  | adddate('2023-01-01', 1) | varchar(29) | YES  |     | NULL    |       |
  +--------------------------+-------------+------+-----+---------+-------+
  1 row in set (0.00 sec)
  ```


Table 2-11 Date and time functions

No.	MySQL	GaussDB	Difference
1	ADDDATE()	Supported.	The performance of this function is different from that of MySQL due to interval expression differences. For details, see **INTERVAL**.

No.	MySQL	GaussDB	Difference
2	ADDTIME()	Supported.	• MySQL returns NULL if the second input parameter is a string in the DATETIME format. GaussDB can calculate the value. • The value range of an input parameter is ['0001-01-01 00:00:00', 9999-12-31 23:59:59.999999]. • If the first parameter of the ADDTIME function in MySQL is a dynamic parameter (for example, in a prepared statement), the return type is TIME. Otherwise, the parse type of the function is derived from the parse type of the first parameter. The return value rules of the ADDTIME function in GaussDB are as follows: – The first input parameter is of the date type, the second input parameter is of the date type, and the return value is of the time type. – The first input parameter is of the date type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the date type, the second input parameter is of the datetime type, and the return value is of the time type. – The first input parameter is of the date type, the second input parameter is of the time type, and the return value is of the time type. – The first input parameter is of the text type, the second input parameter is of the date type, and the return value is of the text type.

No.	MySQL	GaussDB	Difference
			– The first input parameter is of the text type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the text type, the second input parameter is of the datetime type, and the return value is of the text type. – The first input parameter is of the text type, the second input parameter is of the time type, and the return value is of the text type. – The first input parameter is of the datetime type, the second input parameter is of the date type, and the return value is of the datetime type. – The first input parameter is of the datetime type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the datetime type, the second input parameter is of the datetime type, and the return value is of the datetime type. – The first input parameter is of the datetime type, the second input parameter is of the time type, and the return value is of the datetime type. – The first input parameter is of the time type, the second input parameter is of the date type, and the return value is of the time type. – The first input parameter is of the time type, the second input parameter is of the text type, and the return value is of the text type.

No.	MySQL	GaussDB	Difference
			– The first input parameter is of the time type, the second input parameter is of the datetime type, and the return value is of the time type. – The first input parameter is of the time type, the second input parameter is of the time type, and the return value is of the time type.
3	CONVERT_TZ()	Supported.	-
4	CURDATE()	Supported.	-
5	CURRENT_DATE(), CURRENT_DATE	Supported.	-
6	CURRENT_TIME(), CURRENT_TIME	Supported.	The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only integer values within the range of [0,6] as the precision of the returned time. For other values, an error is reported. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.

No.	MySQL	GaussDB	Difference
7	CURRENT_TIMESTAMP(), CURRENT_TIMESTAMP	Supported.	The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only the input integer value within the range of [0,6] as the precision of the returned time. If the input integer value is greater than 6, an alarm is generated and the time value is output based on the precision 6. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.

No.	MySQL	GaussDB	Difference
8	CURTIME()	Supported.	In GaussDB, if a character string or a non-integer value is entered, the value is implicitly converted into an integer and then the precision is verified. If the value is beyond the [0,6] range, an error is reported. If the value is within the range, the time value is output normally. In MySQL, an error is reported. The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only integer values within the range of [0,6] as the precision of the returned time. For other values, an error is reported. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.
9	YEARWEEK()	Supported.	-
10	DATE_ADD()	Supported.	The performance of this function is different from that of MySQL due to interval expression differences. For details, see **INTERVAL**.
11	DATE_FORMAT()	Supported.	-
12	DATE_SUB()	Supported.	The performance of this function is different from that of MySQL due to interval expression differences. For details, see **INTERVAL**.
13	DATEDIFF()	Supported.	-
14	DAY()	Supported.	-
15	DAYNAME()	Supported.	-
16	DAYOFMONTH()	Supported.	-
17	DAYOFWEEK()	Supported.	-

No.	MySQL	GaussDB	Difference
18	DAYOFYEAR()	Supported.	-
19	EXTRACT()	Supported.	-
20	FROM_DAYS()	Supported.	-
21	FROM_UNIXTIME()	Supported.	-
22	GET_FORMAT()	Supported.	-
23	HOUR()	Supported.	-
24	LAST_DAY	Supported.	-
25	LOCALTIME(), LOCALTIME	Supported.	The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only integer values within the range of [0,6] as the precision of the returned time. For other integer values, an error is reported. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.

No.	MySQL	GaussDB	Difference
26	LOCALTIMESTAMP, LOCALTIMESTAMP()	Supported.	The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only the input integer value within the range of [0,6] as the precision of the returned time. If the input integer value is greater than 6, an alarm is generated and the time value is output based on the precision 6. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.
27	MAKEDATE()	Supported.	-
28	MAKETIME()	Supported.	When the input parameter is NULL, GaussDB does not support self-nesting of the maketime function, but MySQL supports.
29	MICROSECOND()	Supported.	-
30	MINUTE()	Supported.	-
31	MONTH()	Supported.	-
32	MONTHNAME()	Supported.	-

No.	MySQL	GaussDB	Difference
33	NOW()	Supported.	The time value (after the decimal point) output by precision is rounded off in GaussDB and directly truncated in MySQL. The trailing 0s of the time value (after the decimal point) output by precision are not displayed in GaussDB but displayed in MySQL. GaussDB supports only the input integer value within the range of [0,6] as the precision of the returned time. If the input integer value is greater than 6, an alarm is generated and the time value is output based on the precision 6. The valid precision value in MySQL is within [0,6], but the input integer value is divided by 256 to get a remainder. For example, if the input integer value is **257**, the time value with precision 1 is returned.
34	PERIOD_ADD()	Supported.	If the input parameter **period** or result is less than 0, GaussDB reports an error by referring to the performance in MySQL 8.0.x. Integer wrapping occurs in MySQL 5.7. As a result, the calculation result is abnormal.
35	PERIOD_DIFF()	Supported.	If the input parameter or result is less than 0, GaussDB reports an error by referring to the performance in MySQL 8.0.x. Integer wrapping occurs in MySQL 5.7. As a result, the calculation result is abnormal.
36	QUARTER()	Supported.	-
37	SEC_TO_TIME()	Supported.	-
38	SECOND()	Supported.	-
39	STR_TO_DATE()	Supported.	Return value difference: In GaussDB, text is returned. In MySQL, datetime or date is returned.

No.	MySQL	GaussDB	Difference
40	SUBDATE()	Supported.	The performance of this function is different from that of MySQL due to interval expression differences. For details, see **INTERVAL**.

No.	MySQL	GaussDB	Difference
41	SUBTIME()	Supported.	• MySQL returns NULL if the second input parameter is a string in the DATETIME format. GaussDB can calculate the value. • The value range of an input parameter is ['0001-01-01 00:00:00', 9999-12-31 23:59:59.999999]. • If the first parameter of the SUBTIME function in MySQL is a dynamic parameter (for example, in a prepared statement), the return type is TIME. Otherwise, the parse type of the function is derived from the parse type of the first parameter. The return value rules of the SUBTIME function in GaussDB are as follows: – The first input parameter is of the date type, the second input parameter is of the date type, and the return value is of the time type. – The first input parameter is of the date type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the date type, the second input parameter is of the datetime type, and the return value is of the time type. – The first input parameter is of the date type, the second input parameter is of the time type, and the return value is of the time type. – The first input parameter is of the text type, the second input parameter is of the date type, and the return value is of the text type.

No.	MySQL	GaussDB	Difference
			– The first input parameter is of the text type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the text type, the second input parameter is of the datetime type, and the return value is of the text type. – The first input parameter is of the text type, the second input parameter is of the time type, and the return value is of the text type. – The first input parameter is of the datetime type, the second input parameter is of the date type, and the return value is of the datetime type. – The first input parameter is of the datetime type, the second input parameter is of the text type, and the return value is of the text type. – The first input parameter is of the datetime type, the second input parameter is of the datetime type, and the return value is of the datetime type. – The first input parameter is of the datetime type, the second input parameter is of the time type, and the return value is of the datetime type. – The first input parameter is of the time type, the second input parameter is of the date type, and the return value is of the time type. – The first input parameter is of the time type, the second input parameter is of the text type, and the return value is of the text type.

No.	MySQL	GaussDB	Difference
			– The first input parameter is of the time type, the second input parameter is of the datetime type, and the return value is of the time type. – The first input parameter is of the time type, the second input parameter is of the time type, and the return value is of the time type.
42	SYSDATE()	Supported.	The integer value of the MySQL input parameter is wrapped when reaching the maximum value **255** by one byte. The integer in GaussDB is not wrapped.
43	YEAR()	Supported.	-
44	TIME_FORMAT()	Supported.	-
45	TIME_TO_SEC()	Supported.	-
46	TIMEDIFF()	Supported.	-
47	WEEKOFYEAR()	Supported.	-
48	TIMESTAMPADD()	Supported.	-
49	TIMESTAMPDIFF()	Supported.	-
50	TO_DAYS()	Supported.	-
51	TO_SECONDS()	Supported.	-
52	UNIX_TIMESTAMP()	Supported.	Return value difference: In GaussDB, numeric is returned. In MySQL, int is returned.
53	UTC_DATE()	Supported.	MySQL supports calling without parentheses, but GaussDB does not. The integer value of the MySQL input parameter is wrapped when reaching the maximum value **255** by one byte. MySQL input parameters support only integers ranging from 0 to 6. GaussDB supports input parameters that can be implicitly converted to integers ranging from 0 to 6.
54	UTC_TIME()	Supported.	
55	UTC_TIMESTAMP()	Supported.	

No.	MySQL	GaussDB	Difference
56	WEEK()	Supported.	-
57	WEEKDAY()	Supported.	-

2.3.3 String Functions

Table 2-12 String functions

No.	MySQL	GaussDB	Difference
1	BIN()	Supported.	In GaussDB, the types supported by function input parameter 1 are as follows: • Integer types: tinyint, smallint, mediumint, int, and bigint. • Unsigned integer types: tinyint unsigned, smallint unsigned, int unsigned, and bigint unsigned. • Character and text types: char, varchar, tinytext, text, mediumtext, and longtext. Only numeric integer strings are supported, and the integer range is within the bigint range. • Floating-point types: float, real, and double. • Fixed-point types: numeric, decimal, and dec. • Boolean type: bool.
2	CONCAT()	Supported.	The data type of the return value of CONCAT is always text regardless of the data type of the parameter. However, in MySQL, if CONCAT contains binary parameters, the return value is binary.
3	CONCAT_WS()	Supported.	The data type of the return value of CONCAT_WS is always text regardless of the data type of the parameter. However, in MySQL, if CONCAT_WS contains binary parameters, the return value is binary. In other cases, the return value is a string.

No.	MySQL	GaussDB	Difference
4	ELT()	Supported.	• In GaussDB, the types supported by function input parameter 1 are as follows: Integer types: tinyint, smallint, mediumint, int, and bigint. Unsigned integer types: tinyint unsigned, smallint unsigned, and int unsigned. Character and text types: char, varchar, tinytext, text, mediumtext, and longtext. Only numeric integer strings are supported, and the integer range is within the bigint range. Floating-point types: float, real, and double. Fixed-point types: numeric, decimal, and dec. Boolean type: bool. • In GaussDB, the types supported by function input parameter 2 are as follows: Integer types: tinyint, smallint, mediumint, int, and bigint. Unsigned integer types: tinyint unsigned, smallint unsigned, int unsigned, and bigint unsigned. Character and text types: char, varchar, tinytext, text, mediumtext, and longtext. Floating-point types: float, real, and double. Fixed-point types: numeric, decimal, and dec. Boolean type: bool. Large object types: tinyblob, blob, mediumblob, and longblob. Date types: datetime, timestamp, date, and time.

No.	MySQL	GaussDB	Difference
5	FIELD	Supported.	When function input parameters range from the maximum bigint value to the maximum bigint unsigned value, incompatibility occurs. When function input parameters are of float(m, d), double(m, d), or real(m, d) type, the precision is higher and incompatibility occurs.
6	FIND_IN_SET()	Supported.	When the database encoding is set to **'SQL_ASCII'**, the default case sensitivity rule is not supported. That is, if no character set rule is specified, uppercase and lowercase letters are treated as distinct.
7	INSERT()	Supported.	• The range of input parameters of the Int64 type is from –9223372036854775808 to +9223372036854775807. If a value is out of range, an error is reported. MySQL does not limit the range of input parameters of the numeric type. If an exception occurs, an alarm is generated, indicating that the value is set to the upper or lower limit. • The maximum length of the input parameter of the text type is 2^30 – 5 bytes, and the maximum length of the input parameter of the bytea type is 2^30 – 512 bytes. • If any of the **s1** and **s2** parameters is of the bytea type and the result contains invalid characters, the displayed result may be different from that of MySQL, but the character encoding is the same as that of MySQL.
8	LOCATE()	Supported.	When input parameter 1 is of the bytea type and input parameter 2 is of the text type, the behavior of GaussDB is different from that of MySQL.

No.	MySQL	GaussDB	Difference
9	MAKE_SET()	Supported.	• When the **bits** parameter is an integer, the maximum range is int128, which is smaller than the MySQL range. • When the **bits** parameter is of the date type (datetime, timestamp, date, or time), it is not supported because the conversion from the date type to the integer type is different from that in MySQL. • GaussDB and MySQL are inherently different in the bit and Boolean types, causing different returned results. When the **bits** input parameter is of the Boolean type, and the **str** input parameter is of the bit or Boolean type, they are not supported. • When the **bits** input parameter is of the character string or text type, only the pure integer format is supported. In addition, the value range of pure integers is limited to bigint. • The integer value of the **str** input parameter exceeds the range from 81 negative nines to 81 positive nines. The return value is different from that of MySQL. • When the **str** input parameter is expressed in scientific notation, trailing zeros are displayed in GaussDB but not displayed in MySQL. This is an inherent difference.

No.	MySQL	GaussDB	Difference
10	QUOTE()	Supported.	• If the **str** character string contains "\Z", "\r", "\%", or "_", GaussDB does not escape it, which is different from MySQL. The slash followed by digits may also cause differences, for example, "\563". This function difference is the escape character difference between GaussDB and MySQL. • The output format of "\b" in the **str** character string is different from that in MySQL. This is an inherent difference between GaussDB and MySQL. • If the **str** character string contains "\0", GaussDB cannot identify the character because the UTF-8 character set cannot identify the character. As a result, the input fails. This is an inherent difference between GaussDB and MySQL. • If **str** is of the bit or Boolean type, this type is not supported because it is different in GaussDB and MySQL. • GaussDB supports a maximum of 1 GB data transfer. The maximum length of the **str** input parameter is 536870908, and the maximum size of the result string returned by the function is 1 GB. • The integer value of the **str** input parameter exceeds the range from 81 negative nines to 81 positive nines. The return value is different from that of MySQL. • When the **str** input parameter is expressed in scientific notation, trailing zeros are displayed in GaussDB but not displayed in MySQL. This is an inherent difference.

No.	MySQL	GaussDB	Difference
11	SPACE()	Supported.	1. The maximum value of GaussDB input parameter 1 is **1073741818**. If the value exceeds 1073741818, an empty string is returned. By default, the maximum value of MySQL input parameter 1 is **4194304**. If the value exceeds 4194304, an alarm is generated. 2. In GaussDB, the types supported by function input parameter 1 are as follows: ● Integer types: tinyint, smallint, mediumint, int, and bigint. ● Unsigned integer types: tinyint unsigned, smallint unsigned, and int unsigned. ● Character and text types: char, varchar, tinytext, text, mediumtext, and longtext. Only numeric integer strings are supported, and the integer range is within the bigint range. ● Floating-point types: float, real, and double. ● Fixed-point types: numeric, decimal, and dec. ● Boolean type: bool.
12	SUBSTR()	Supported.	-
13	SUBSTRING()	Supported.	-
14	SUBSTRING_INDEX()	Supported.	-

No.	MySQL	GaussDB	Difference
15	STRCMP()	Supported.	1. Different from MySQL, GaussDB supports the following input parameter types: • Character types: CHAR, VARCHAR, NVARCHAR2, and TEXT. • Binary type: BYTEA. • Numeral types: TINYING [UNSIGNED], SMALLINT [UNSIGNED], INTEGER [UNSIGNED], BIGINT [UNSIGNED], FLOAT4, FLOAT8, and NUMERIC. • Date and time types: DATE, TIME WITHOUT TIME ZONE, DATETIME, and TIMESTAMPTZ. 2. For the floating-point type in the numeric type, the precision may be different from that in MySQL due to different connection parameter settings. Therefore, this scenario is not recommended, or the NUMERIC type is used instead.
16	SHA()/SHA1()	Supported.	-
17	SHA2()	Supported.	-

2.3.4 Forced Conversion Functions

Table 2-13 Forced conversion functions

No.	MySQL	GaussDB	Difference
1	CAST()	Supported	The data type conversion rules and supported conversion types are subject to the conversion scope and rules supported by GaussDB.

No.	MySQL	GaussDB	Difference
2	CONVERT()	Supported	The data type conversion rules and supported conversion types are subject to the conversion scope and rules supported by GaussDB.

2.3.5 Encryption Functions

Table 2-14 Encryption functions

No.	MySQL	GaussDB	Difference
1	AES_DECRYPT()	Supported.	-
2	AES_ENCRYPT()	Supported.	-

2.3.6 JSON Functions

NOTE

JSON function differences:

1. For JSON functions and other character input parameter functions, if the input contains escape characters, you need to set the GUC parameter **set standard_conforming_strings** to **off**, which is different from MySQL by default. In this case, escape characters are compatible with MySQL. However, a warning alarm is generated for non-standard character input. Escape characters \t and \u, and escape digits are different from those in MySQL. If the GUC parameter is not set, the JSON_UNQUOTE() function is still compatible with MySQL and no alarm is reported.
2. When processing an ultra-long number (the number contains more than 64 characters), the JSON function of GaussDB parses the number as a DOUBLE and uses scientific notation for counting. The input parameters of the non-JSON type are the same as those of MySQL. However, when input parameters of the JSON type are used, the JSON type is not completely compatible with MySQL. As a result, differences occur in this scenario. MySQL displays complete numbers. (When the number length exceeds 82, MySQL displays an incorrect result.) GaussDB still parses an ultra-long number into a double-precision value. Long numbers are stored using floating-point numbers. During calculation, precision loss occurs in both GaussDB and MySQL. Therefore, you are advised to use character strings to store long numbers.

```
gaussdb=# select json_insert('[1, 4,
99999999999999999999999999999999999999999999999999999999999999999999999999999]','$[6]',j
son_insert('[1,4]','$[5]',99999999999999999999999999999999999999999999999999999999999999999999999999999
999999999));
        json_insert
-----------------------------
 [1, 4, 1e+74, [1, 4, 1e+74]]
(1 row)
```

Table 2-15 JSON functions

No.	MySQL	GaussDB	Difference
1	JSON_APPEND()	Supported.	-
2	JSON_ARRAY()	Supported.	-
3	JSON_ARRAY_APPEND()	Supported.	-
4	JSON_ARRAY_INSERT()	Supported.	-
5	JSON_CONTAINS()	Supported.	-
6	JSON_CONTAINS_PATH()	Supported.	-
7	JSON_DEPTH()	Supported.	Return value difference: In GaussDB, int is returned. In MySQL, bigint is returned.
8	JSON_EXTRACT()	Supported.	-
9	JSON_INSERT()	Supported.	-

No.	MySQL	GaussDB	Difference
10	JSON_KEYS()	Supported.	-
11	JSON_LENGTH()	Supported.	Return value difference: In GaussDB, int is returned. In MySQL, bigint is returned.
12	JSON_MERGE()	Supported.	-
13	JSON_OBJECT()	Supported.	-
14	JSON_QUOTE()	Supported.	Return value difference: In GaussDB, JSON is returned. In MySQL, varchar or text is returned.
15	JSON_REMOVE()	Supported.	-
16	JSON_REPLACE()	Supported.	-
17	JSON_SEARCH()	Supported.	Return value difference: In GaussDB, text is returned. In MySQL, JSON is returned.
18	JSON_SET()	Supported.	-
19	JSON_TYPE()	Supported.	JSON values of the numeric type are identified as number, which is different from MySQL.
20	JSON_UNQUOTE()	Supported.	-
21	JSON_VALID()	Supported.	-

2.3.7 Aggregate Functions

Table 2-16 Aggregate functions

No.	MySQL	GaussDB	Difference
1	GROUP_CONCAT()	Supported.	1. If the **group_concat** parameter contains both the DISTINCT and ORDER BY syntaxes, all expressions following ORDER BY must be in the DISTINCT expression. 2. **group_concat(... order by *Number*)** does not indicate the sequence of the parameter. The number is only a constant expression, which is equivalent to no sorting. 3. The data type of the return value of **group_concat** is always text regardless of the data type of the parameter. For MySQL, if **group_concat** contains binary parameters, the return value is binary. In other cases, the return value is a character string. If the return value length is greater than 512 bytes, the data type is a character large object or binary large object. 4. The value of **group_concat_max_len** ranges from 0 to 1073741823. The maximum value is smaller than that of MySQL.

No.	MySQL	GaussDB	Difference
2	DEFAULT()	Supported.	1. The default value of a column is an array. GaussDB returns an array. MySQL does not support the array type. 2. GaussDB columns are hidden columns (such as **xmin** and **cmin**). The function returns a null value. 3. GaussDB supports default values of partitioned tables, temporary tables, and multi-table join query. 4. GaussDB supports the query of nodes whose column names contain character string values (indicating names) and A_Star nodes (indicating that asterisks [*] appear), for example, **default(tt.t4.id)** and **default(tt.t4.*)**. For invalid query column names and A_Star nodes, the error information reported by GaussDB is different from that reported by MySQL. 5. When the default value of a column is created in GaussDB, the range of the column type is not verified. As a result, an error may be reported when the default function is used. 6. If the default value of a column is a function expression, the default function in GaussDB returns the calculated value of the default expression of the column during table creation. The default function in MySQL returns NULL.

2.3.8 Arithmetic Functions

Table 2-17 Arithmetic functions

No.	MySQL	GaussDB	Difference
1	log2()	Supported.	1. The display of decimal places is different from that in MySQL. Due to the restriction of the GaussDB floating-point data type, the **extra_float_digits** parameter is used to control the number of decimal places to be displayed. 2. Due to the internal processing difference of the input precision, the calculation results of GaussDB and MySQL are different. 3. The following data types are supported: ● Integer types: bigint, int16, int, smallint, and tinyint. ● Unsigned integer types: bigint unsigned, integer unsigned, smallint unsigned, and tinyint unsigned. ● Floating-point types: numeric and real. ● String types: character, character varying, clob, text, and numeric. However, only numeric integer strings are supported. ● SET type. ● NULL type.
2	log10()	Supported.	1. The display of decimal places is different from that in MySQL. Due to the restriction of the GaussDB floating-point data type, the **extra_float_digits** parameter is used to control the number of decimal places to be displayed. 2. Due to the internal processing difference of the input precision, the calculation results of GaussDB and MySQL are different. 3. The following data types are supported: ● Integer types: bigint, int16, int, smallint, and tinyint. ● Unsigned integer types: bigint unsigned, integer unsigned, smallint unsigned, and tinyint unsigned. ● Floating-point types: numeric and real. ● String types: character, character varying, clob, text, and numeric. However, only numeric integer strings are supported. ● SET type. ● NULL type.

2.3.9 Other Functions

Table 2-18 Other functions

No.	MySQL	GaussDB	Difference
1	UUID()	Supported	-
2	UUID_SHORT()	Supported	-

2.4 Operators

GaussDB is compatible with most MySQL operators, but there are some differences. If not listed, the operator behavior is the native GaussDB behavior by default.

No.	MySQL	GaussDB	Difference
1	NULL-safe equal (<=>)	Supported.	-

No.	MySQL	GaussDB	Difference
2	[NOT] REGEXP	Supported.	• When **b_format_dev_version** is set to **'s2'**, the **pattern** string contains escape characters such as '\\a', '\\d', '\\e', '\\n', '\\Z', and '\\u', and the source strings '\a', '\d', '\e', '\n', '\Z', and '\u' are matched, the behavior of GaussDB is different from that of MySQL 5.7. MySQL 5.7 has a bug, which has been fixed in later MySQL versions and is now consistent with GaussDB. • When **b_format_dev_version** is set to **'s2'**, GaussDB's **'\b'** can match **'\\b'**, but MySQL cannot. • GaussDB reports an error when the input parameter of the pattern string **pat** is invalid and only the right single parenthesis ')' exists. MySQL has a bug, which has been fixed in later versions. • When **de|abc** matches **de** or **abc**, if there is a null value on the left or right of |, MySQL reports an error. This bug has been fixed in later versions. • The regular expression of the blank character [\t] can match the character class [:blank:] in GaussDB, but MySQL's [\t] cannot match [:blank:]. MySQL has a bug, which has been fixed in later versions. • GaussDB supports non-greedy pattern matching. That is, the number of matching characters is as small as possible. A question mark (?) is added after some special characters, for example, ??, *?, +?, {n}?, {n,}?, and {n,m}?. MySQL 5.7 does not support non-greedy

No.	MySQL	GaussDB	Difference
			pattern matching, and the error message "Got error 'repetition-operator operand invalid' from regexp" is displayed. MySQL 8.0 already supports this function. • In the binary character set, the text and BLOB types are converted to the bytea type. The REGEXP operator does not support the bytea type. Therefore, the two types cannot be matched.
3	[NOT] RLIKE	Supported.	Same as [NOT] REGEXP.

2.5 Character Sets

GaussDB allows you to specify the following character sets for databases, schemas, tables, or columns.

Table 2-19 Character sets

No.	MySQL	GaussDB
1	utf8mb4	Supported
2	gbk	Supported
3	gb18030	Supported

NOTE

Currently, GaussDB does not perform strict encoding logic verification on invalid characters that do not belong to the current character set. As a result, such invalid characters may be successfully entered. However, an error is reported during verification in MySQL.

2.6 Collation Rules

GaussDB allows you to specify the following collation rules for schemas, tables, or columns.

NOTE

Differences in collation rules:

- Currently, only the character string type and some binary types support the specified collation rules. You can check whether the **typcollation** attribute of a type in the pg_type system catalog is not 0 to determine whether the type supports the collation. The collation can be specified for all types in MySQL. However, collation rules are meaningless except those for character strings and binary types.
- The current collation rules can be specified only when the corresponding character set is the same as the database-level character set.
- The default collation of the utf8mb4 character set is utf8mb4_general_ci, which is the same as that in MySQL 5.7. utf8mb4_0900_ai_ci is not the default collation of utf8mb4.
- In GaussDB, utf8 and utf8mb4 are the same character set.

Table 2-20 Collation rules

No.	MySQL	GaussDB
1	utf8mb4_general_ci	Supported.
2	utf8mb4_unicode_ci	Supported.
3	utf8mb4_bin	Supported.
4	gbk_chinese_ci	Supported.
5	gbk_bin	Supported.
6	gb18030_chinese_ci	Supported.
7	gb18030_bin	Supported.
8	binary	Supported.
9	utf8mb4_0900_ai_ci	Supported.
10	utf8_general_ci	Supported.
11	utf8_bin	Supported.

2.7 SQL

GaussDB is compatible with most MySQL syntax, but there are some differences. This chapter describes the MySQL syntax supported by GaussDB.

2.7.1 DDL

Table 2-21 DDL syntax compatibility

No.	Description	Syntax	Difference
1	Create primary keys and UNIQUE indexes during table creation and modification.	ALTER TABLE and CREATE TABLE	• GaussDB does not support the UNIQUE INDEX|KEY index_name syntax. An error will be reported when the UNIQUE INDEX|KEY index_name syntax is used. However, MySQL supports these functions. • When a constraint is created as a global secondary index and USING BTREE is specified in the SQL statement, the underlying index is created as UB-tree. • When the table joined with the constraint is Ustore and USING BTREE is specified in the SQL statement, the underlying index is created as UB-tree.

No.	Description	Syntax	Difference
2	Support prefix indexes.	CREATE INDEX	• The prefix length cannot exceed 2676. The actual length of the key value is restricted by the internal page. If a column contains multi-byte characters or an index has multiple keys, an error may be reported when the index line length exceeds the threshold. • In the CREATE INDEX syntax, the following keywords cannot be used as prefix keys for column names: COALESCE, EXTRACT, GREATEST, LEAST, LNNVL, NULLIF, NVL, NVL2, OVERLAY, POSITION, REGEXP_LIKE, SUBSTRING, TIMESTAMPDIFF, TREAT, TRIM, XMLCONCAT, XMLELEMENT, XMLEXISTS, XMLFOREST, XMLPARSE, XMLPI, XMLROOT, and XMLSERIALIZE. • Prefix keys are not supported in primary key and unique key indexes.
3	Specify character sets and collation rules.	ALTER SCHEMA, ALTER TABLE, CREATE SCHEMA, and CREATE TABLE	-
4	Create a partitioned table.	CREATE TABLE PARTITION	-
5	Specify table-level and column-level comments during table creation and modification.	CREATE TABLE and ALTER TABLE	-
6	Specify index-level comments during index creation.	CREATE INDEX	-

No.	Description	Syntax	Difference
7	Exchange the partition data of an ordinary table and a partitioned table.	ALTER TABLE PARTITION	Differences in ALTER TABLE EXCHANGE PARTITION: ● If MySQL tables or partitions use tablespaces, data in partitions and ordinary tables cannot be exchanged. If GaussDB tables or partitions use different tablespaces, data in partitions and ordinary tables can still be exchanged. ● MySQL does not verify the default values of columns. Therefore, data in partitions and ordinary tables can be exchanged even if the default values are different. GaussDB verifies the default values. If the default values are different, data in partitions and ordinary tables cannot be exchanged. ● After the DROP COLUMN operation is performed on a partitioned table or an ordinary table in MySQL, if the table structure is still consistent, data can be exchanged between partitions and ordinary tables. In GaussDB, data can be exchanged between partitions and ordinary tables only when the deleted columns of ordinary tables and partitioned tables are strictly aligned. ● MySQL and GaussDB use different hash algorithms. Therefore, data stored in the same hash partition may be inconsistent. As a result, the exchanged data may also be inconsistent. ● MySQL partitioned tables do not support foreign keys. If an ordinary table contains foreign keys or other tables

No.	Description	Syntax	Difference
			reference foreign keys of an ordinary table, data in partitions and ordinary tables cannot be exchanged. GaussDB partitioned tables support foreign keys. If the foreign key constraints of two tables are the same, data in partitions and ordinary tables can be exchanged. If a GaussDB partitioned table does not contain foreign keys, an ordinary table is referenced by other tables, and the partitioned table is the same as the ordinary table, data in the partitioned table can be exchanged with that in the ordinary table.

No.	Description	Syntax	Difference
8	Support auto-increment columns.	ALTER TABLE and CREATE TABLE	• Currently, only local auto-increment columns of each DN are supported. • It is recommended that the auto-increment column be the first column of a non-global secondary index. Otherwise, an alarm is generated when a table is created, and errors may occur when some operations are performed on a table that contains auto-increment columns, for example, ALTER TABLE EXCHANGE PARTITION. The auto-increment column in MySQL must be the first column of the index. • In the syntax AUTO_INCREMENT = value, **value** must be a positive number less than 2^127. MySQL does not verify the value. • An error occurs if the auto-increment continues after an auto-increment value reaches the maximum value of a column data type. In MySQL, errors or warnings may be generated during auto-increment, and sometimes auto-increment continues until the maximum value is reached. • GaussDB does not support the *innodb_autoinc_lock_mode* system variable, but when its GUC parameter **auto_increment_cache** is set to **0**, the behavior of inserting auto-increment columns in batches is similar to that when the MySQL system variable

No.	Description	Syntax	Difference
			innodb_autoinc_lock_mode is set to **1**. ● When 0s, NULLs, and definite values are imported or batch inserted into auto-increment columns, the auto-increment values inserted after an error occurs in GaussDB may not be the same as those in MySQL. – The **auto_increment_cache** parameter is provided to control the number of reserved auto-increment values. ● In different execution plans, the auto-increment sequence and reserved auto-increment values may be different from those in MySQL. For example, "INSERT INTO table VALUES(...),(...),..." is distributed to different DNs. Therefore, in some execution plans, DNs cannot obtain the number of rows to be inserted. – The **auto_increment_cache** parameter is provided to control the number of reserved auto-increment values. ● When auto-increment is triggered by parallel import or insertion of auto-increment columns, the cache value reserved for each parallel thread is used only in the thread. If the cache value is not used up, the values of auto-increment columns in the table are discontinuous. The auto-increment value generated by parallel insertion cannot be

No.	Description	Syntax	Difference
			guaranteed to be the same as that generated in MySQL. ● The SERIAL data type of GaussDB is an original auto-increment column, which is different from the **AUTO_INCREMENT** column. The SERIAL data type of MySQL is the **AUTO_INCREMENT** column. ● The value of **auto_increment_offset** cannot be greater than that of **auto_increment_increment**. Otherwise, an error occurs. MySQL allows it and states that **auto_increment_offset** will be ignored. ● If a table has a primary key or index, the sequence in which the **ALTER TABLE** command rewrites table data may be different from that in MySQL. GaussDB rewrites table data based on the table data storage sequence, while MySQL rewrites table data based on the primary key or index sequence. As a result, the auto-increment sequence may be different. ● When the **ALTER TABLE** command is used to add or modify auto-increment columns, the number of auto-increment values reserved for the first time is the number of rows in the table statistics. The number of rows in the statistics may not be the same as that in MySQL. ● When auto-increment is performed in a trigger or user-defined function, the return value of last_insert_id

No.	Description	Syntax	Difference
			is updated. MySQL does not update it. • If the values of the GUC parameters **auto_increment_offset** and **auto_increment_increment** are out of range, an error occurs. MySQL automatically changes the value to a boundary value. • The last_insert_id function is not supported. • Currently, local temporary tables do not support auto-increment columns. • If **sql_mode** is set to **no_auto_value_on_zero**, the auto-increment columns of the table are not subject to NOT NULL constraints. In GaussDB and MySQL, when the value of an auto-increment column is not specified, **NULL** will be inserted into the auto-increment column, but auto-increment is triggered for the former and not triggered for the latter.
9	Delete the primary key constraints of a table.	ALTER TABLE	-

No.	Description	Syntax	Difference
10	Support the CREATE TABLE ... LIKE syntax.	CREATE TABLE ... LIKE	• In versions earlier than MySQL 8.0.16, CHECK constraints are parsed but their functions are ignored. In this case, CHECK constraints are not replicated. GaussDB supports replication of CHECK constraints. • For the set data type, MySQL supports replication while GaussDB does not during table creation. • When a table is created, all primary key constraint names in MySQL are fixed to **PRIMARY KEY**. GaussDB does not support replication of primary key constraint names. • When a table is created, MySQL supports replication of unique key constraint names, but GaussDB does not. • When a table is created, MySQL versions earlier than 8.0.16 do not have CHECK constraint information, but GaussDB supports replication of CHECK constraint names. • When a table is created, MySQL supports replication of index names, but GaussDB does not. • When a table is created across sql_mode, MySQL is controlled by the loose mode and strict mode. The strict mode may become invalid in GaussDB. For example, if the source table has the default value **"0000-00-00"**, GaussDB can create a table that contains the default value **"0000-00-00"** in "no_zero_date" strict mode,

No.	Description	Syntax	Difference
			which means that the strict mode is invalid. MySQL fails to create the table because it is controlled by the strict mode. • MySQL supports cross-database table creation, but GaussDB does not. • If the source table is a temporary table, you can create a non-temporary table in MySQL but not in GaussDB.
11	Compatible with syntax for changing table names.	ALTER TABLE[IF EXISTS] tbl_name RENAME [TO | AS | =] new_tbl_name; RENAME {TABLE | TABLES} tbl_name TO new_tbl_name [, tbl_name2 TO new_tbl_name2, ...];	• The ALTER RENAME syntax in GaussDB supports only the function of changing the table name and cannot be coupled with other function operations. • In GaussDB, only the old table name column supports the usage of schema.table_name, and the new and old table names belong to the same schema. • GaussDB does not support renaming of old and new tables across schemas. However, if you have the permission, you can modify the names of tables in other schemas in the current schema. • The syntax for renaming multiple groups of tables in GaussDB supports renaming of all local temporary tables, but does not support the combination of local temporary tables and non-local temporary tables.

No.	Description	Syntax	Difference
12	Create a partition.	ALTER TABLE [IF EXISTS] { table_name [*] | ONLY table_name | ONLY (table_name)} action [, ...]; action: move_clause | exchange_clause | row_clause | merge_clause | modify_clause | split_clause | add_clause | drop_clause | ilm_clause add_clause: ADD {{partition_less_than_item | partition_start_end_item | partition_list_item } | PARTITION({partition_less_than_item | partition_start_end_item | partition_list_item })}	• The ALTER TABLE table_name ADD PARTITION (partition_definition1, partition_definition1,…); syntax cannot be used to add multiple partitions. • Only the original syntax for adding multiple partitions is supported: ALTER TABLE table_name ADD PARTITION (partition_definition1), ADD PARTITION (partition_definition2[y1]), …;.

2.7.2 DML

Table 2-22 DML syntax compatibility

No.	Description	Syntax	Difference
1	DELETE supports ORDER BY and LIMIT.	DELETE	-
2	UPDATE supports ORDER BY and LIMIT.	UPDATE	-

No.	Description	Syntax	Difference

3	Support the REPLACE INTO syntax.	REPLACE	• Difference between the initial values of the time type. For example:
			– MySQL is not affected by the strict or loose mode. You can insert time 0 into a table.
			mysql> CREATE TABLE test(f1 TIMESTAMP NOT NULL, f2 DATETIME NOT NULL, f3 DATE NOT NULL);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> REPLACE INTO test VALUES(f1, f2, f3);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> SELECT * FROM test;
			+---------------------+---------------------+------------+
			| f1 | f2 | f3 |
			+---------------------+---------------------+------------+
			| 0000-00-00 00:00:00 | 0000-00-00 00:00:00 | 0000-00-00 |
			+---------------------+---------------------+------------+
			1 row in set (0.00 sec)
			– The time 0 can be successfully inserted only when GaussDB is in loose mode.
			gaussdb=# SET b_format_version = '5.7';
			SET
			gaussdb=# SET b_format_dev_version = 's1';
			SET
			gaussdb=# SET sql_mode = '';
			SET
			gaussdb=# CREATE TABLE test(f1 TIMESTAMP NOT NULL, f2 DATETIME NOT NULL, f3 DATE NOT NULL) DISTRIBUTE BY HASH(f1);
			CREATE TABLE
			gaussdb=# REPLACE INTO test VALUES(f1, f2, f3);
			REPLACE 0 1
			gaussdb=# SELECT * FROM test;
			f1 | f2 | f3
			---------------------+---------------------+------------
			0000-00-00 00:00:00 | 0000-00-00 00:00:00 | 0000-00-00
			(1 row)
			In strict mode, the error is reported: date/time field value out of range: "0000-00-00 00:00:00".
			• Difference between the initial values of the BIT type when NOT NULL exists. For example:
			– The initial value of the BIT type is an empty string '' in MySQL, that is:
			mysql> CREATE TABLE test(f1 BIT(3) NOT NULL);
			Query OK, 0 rows affected (0.01 sec)
			
			mysql> REPLACE INTO test VALUES(f1);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> SELECT f1, f1 IS NULL FROM test;
			+----+------------+
			| f1 | f1 is null |
			+----+------------+

No.	Description	Syntax	Difference

			<pre>| | 0 |
			| | 0 |
			+----+------------+
			2 rows in set (0.00 sec)</pre>
			– If the initial value of the BIT type is **NULL** in GaussDB, an error is reported.
			<pre>gaussdb=# CREATE TABLE test(f1 int, f2 BIT(3) NOT NULL) DISTRIBUTE BY HASH(f1);
			CREATE TABLE
			gaussdb=# REPLACE INTO test VALUES(1, f2);
			ERROR: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (1, null).</pre>

4	SELECT supports multi-partition query.	SELECT	-
5	UPDATE supports multi-partition update.	UPDATE	-

No.	Description	Syntax	Difference
6	Import data by using LOAD DATA.	LOAD DATA	• The execution result of the LOAD DATA syntax is the same as that in MySQL strict mode. The loose mode is not adapted currently. • The **IGNORE** and **LOCAL** parameters are used only to ignore the conflicting rows when the imported data conflicts with the data in the table and to automatically fill default values for other columns when the number of columns in the file is less than that in the table. Other functions are not supported currently. • If the keyword LOCAL is specified and the file path is a relative path, the file is searched from the binary directory. If the keyword LOCAL is not specified and the file path is a relative path, the file is searched from the data directory. • If single quotation marks are specified as separators, escape characters, and newline characters in the syntax, lexical parsing errors occur. • The **[(col_name_or_user_var [, col_name_or_user_var]...)]** parameter cannot be used to specify a column repeatedly. • The newline character specified by **[FIELDS TERMINATED BY 'string']** cannot be the same as the separator specified by **[LINES TERMINATED BY'string']**. • If the data written to a table by running **LOAD DATA** cannot be converted to the data type of the table, an error is reported. • Columns can only be specified by column name instead of user variables. • The LOAD DATA SET expression does not support the calculation of a specified column name. • If no implicit conversion function exists between the return value type of the SET expression and the corresponding column type, an error is reported. • LOAD DATA does not support the INSERT or DELETE trigger. • LOAD DATA applies only to tables but not views.

No.	Description	Syntax	Difference
			• The default newline character of the file in Windows is different from that in Linux. LOAD DATA cannot identify this scenario and reports an error. You are advised to check the newline character at the end of lines of the file to be imported.

No.	Description	Syntax	Difference

7	Compatible with INSERT IGNORE.	INSERT IGNORE	• GaussDB displays the error information after the downgrade. MySQL records the error information after the downgrade to the error stack and runs the **show warnings;** command to view the error information. For example:
			• Time type difference. For example:
			– The default values of **date**, **datetime**, and **timestamp** in GaussDB are **0**.
			gaussdb=# CREATE TABLE test(f1 DATE NOT NULL, f2 DATETIME NOT NULL, f3 TIMESTAMP NOT NULL);
			CREATE TABLE
			gaussdb=# INSERT IGNORE INTO test VALUES(NULL, NULL, NULL);
			WARNING: null value in column "f1" violates not-null constraint
			DETAIL: Failing row contains (null, null, null, null).
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (null, null, null, null).
			WARNING: null value in column "f3" violates not-null constraint
			DETAIL: Failing row contains (null, null, null, null).
			INSERT 0 1
			gaussdb=#
			SELECT * FROM test;
			f1 | f2 | f3
			------------+---------------------+---------------------
			1970-01-01 | 1970-01-01 00:00:00 | 1970-01-01 00:00:00
			(1 row)
			– The default values of **date**, **datetime**, and **timestamp** in MySQL are **0**.
			mysql> CREATE TABLE test(f1 DATE NOT NULL, f2 DATETIME NOT NULL, f3 TIMESTAMP NOT NULL);
			Query OK, 0 rows affected (0.00 sec)
			
			mysql> INSERT IGNORE INTO test VALUES(NULL, NULL, NULL);
			Query OK, 1 row affected, 3 warnings (0.00 sec)
			
			mysql> show warnings;
			+---------+------+----------------------------+
			| Level | Code | Message |
			+---------+------+----------------------------+
			| Warning | 1048 | Column 'f1' cannot be null |
			| Warning | 1048 | Column 'f2' cannot be null |
			| Warning | 1048 | Column 'f3' cannot be null |
			+---------+------+----------------------------+
			3 rows in set (0.00 sec)
			
			mysql> SELECT * FROM test;
			+------------+---------------------+---------------------+
			| f1 | f2 | f3 |
			+------------+---------------------+---------------------+
			| 0000-00-00 | 0000-00-00 00:00:00 | 0000-00-00 00:00:00 |
			+------------+---------------------+---------------------+
			1 row in set (0.00 sec)

No.	Description	Syntax	Difference

			• GaussDB does not support the MySQL bit type. Therefore, the INSERT IGNORE error downgrade is not supported when the NOT NULL constraint of the bit type is ignored and the length of the inserted bit type is different from that defined.
			– Bit type in GaussDB
			gaussdb=# CREATE TABLE test(f1 BIT(10) NOT NULL);
			CREATE TABLE
			gaussdb=# INSERT IGNORE INTO test VALUES(NULL);
			ERROR: Un-support feature
			DETAIL: ignore null for insert statement is not supported in column f1.
			gaussdb=# INSERT IGNORE INTO test VALUES('1010');
			ERROR: bit string length 4 does not match type bit(10)
			CONTEXT: referenced column: f1
			– Bit type in MySQL
			mysql> CREATE TABLE test(f1 BIT(10) NOT NULL);
			Query OK, 0 rows affected (0.00 sec)
			
			mysql> INSERT IGNORE INTO test VALUES(NULL);
			Query OK, 1 row affected, 1 warning (0.00 sec)
			
			mysql> INSERT IGNORE INTO test VALUES('1010');
			Query OK, 1 row affected, 1 warning (0.01 sec)
			• If the precision is specified for the time type in MySQL, the precision is displayed when the zero value is inserted. It is not displayed in GaussDB. For example:
			– Time precision specified in GaussDB
			gaussdb=# CREATE TABLE test(f1 TIME(3) NOT NULL, f2 DATETIME(3) NOT NULL, f3 TIMESTAMP(3) NOT NULL);
			CREATE TABLE
			gaussdb=# INSERT IGNORE INTO test VALUES(NULL,NULL,NULL);
			WARNING: null value in column "f1" violates not-null constraint
			DETAIL: Failing row contains (null, null, null).
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (null, null, null).
			WARNING: null value in column "f3" violates not-null constraint
			DETAIL: Failing row contains (null, null, null).
			INSERT 0 1
			gaussdb=# SELECT * FROM test;
			f1 | f2 | f3
			----------+----------------------+----------------------
			00:00:00 | 1970-01-01 00:00:00 | 1970-01-01 00:00:00
			(1 row)
			– Time precision specified in MySQL

No.	Description	Syntax	Difference

			mysql> CREATE TABLE test(f1 TIME(3) NOT NULL, f2 DATETIME(3) NOT NULL, f3 TIMESTAMP(3) NOT NULL);
			Query OK, 0 rows affected (0.00 sec)
			
			mysql> INSERT IGNORE INTO test VALUES(NULL,NULL,NULL);
			Query OK, 1 row affected, 3 warnings (0.00 sec)
			
			mysql> SELECT * FROM test;
			+--------------+-------------------------+-------------------------+
			| f1 | f2 | f3 |
			+--------------+-------------------------+-------------------------+
			| 00:00:00.000 | 0000-00-00 00:00:00.000 | 0000-00-00 00:00:00.000 |
			+--------------+-------------------------+-------------------------+
			1 row in set (0.00 sec)
			• The execution process in MySQL is different from that in GaussDB. Therefore, the number of generated warnings may be different. For example:
			– Number of warnings generated in GaussDB
			gaussdb=# CREATE TABLE test(f1 INT, f2 INT not null);
			CREATE TABLE
			gaussdb=# INSERT INTO test VALUES(1,0),(3,0),(5,0);
			INSERT 0 3
			gaussdb=# INSERT IGNORE INTO test SELECT f1+1, f1/f2 FROM test;
			WARNING: division by zero
			CONTEXT: referenced column: f2
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (2, null).
			WARNING: division by zero
			CONTEXT: referenced column: f2
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (4, null).
			WARNING: division by zero
			CONTEXT: referenced column: f2
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (6, null).
			INSERT 0 3
			– Number of warnings generated in MySQL
			mysql> CREATE TABLE test(f1 INT, f2 INT not null);
			Query OK, 0 rows affected (0.01 sec)
			
			mysql> INSERT INTO test VALUES(1,0),(3,0),(5,0);
			Query OK, 3 rows affected (0.00 sec)
			Records: 3 Duplicates: 0 Warnings: 0
			
			mysql> INSERT IGNORE INTO test SELECT f1+1, f1/f2 FROM test;

No.	Description	Syntax	Difference

			Query OK, 3 rows affected, 4 warnings (0.00 sec)
			Records: 3 Duplicates: 0 Warnings: 4
			• The differences between MySQL's and GaussDB's INSERT IGNORE in triggers are as follows:
			– INSERT IGNORE used in a GaussDB trigger
			gaussdb=# CREATE TABLE test1(f1 INT NOT NULL);
			CREATE TABLE
			gaussdb=# CREATE TABLE test2(f1 INT);
			CREATE TABLE
			gaussdb=# CREATE OR REPLACE FUNCTION trig_test() RETURNS TRIGGER AS $$
			gaussdb$# BEGIN
			gaussdb$# INSERT IGNORE INTO test1 VALUES(NULL);
			gaussdb$# RETURN NEW;
			gaussdb$# END;
			gaussdb$# $$ LANGUAGE plpgsql;
			CREATE FUNCTION
			gaussdb=# CREATE TRIGGER trig2 BEFORE INSERT ON test2 FOR EACH ROW EXECUTE PROCEDURE trig_test();
			CREATE TRIGGER
			gaussdb=# INSERT INTO test2 VALUES(NULL);
			WARNING: null value in column "f1" violates not-null constraint
			DETAIL: Failing row contains (null).
			CONTEXT: SQL statement "INSERT IGNORE INTO test1 VALUES(NULL)"
			PL/pgSQL function trig_test() line 3 at SQL statement
			INSERT 0 1
			gaussdb=# SELECT * FROM test1;
			f1
			---- 	
			0
			(1 rows)
			
			gaussdb=# SELECT * FROM test2;
			f1
			---- 	
			
			(1 rows)
			– INSERT IGNORE used in a MySQL trigger
			mysql> CREATE TABLE test1(f1 INT NOT NULL);
			Query OK, 0 rows affected (0.01 sec)
			
			mysql> CREATE TABLE test2(f1 INT);
			Query OK, 0 rows affected (0.00 sec)
			
			mysql> DELIMITER ||
			mysql> CREATE TRIGGER trig2 BEFORE INSERT ON test2 FOR EACH ROW
			-> BEGIN
			-> INSERT IGNORE into test1 values(NULL);
			-> END||
			Query OK, 0 rows affected (0.01 sec)
			
			mysql> DELIMITER ;
			mysql> INSERT INTO test2 VALUES(NULL);
			ERROR 1048 (23000): Column 'f1' cannot be null

No.	Description	Syntax	Difference

			mysql> INSERT IGNORE INTO test2 VALUES(NULL);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> SELECT * FROM test1;
			+----+
			| f1 |
			+----+
			| 0 |
			+----+
			1 row in set (0.00 sec)
			
			mysql> SELECT * FROM test2;
			+------+
			| f1 |
			+------+
			| NULL |
			+------+
			1 row in set (0.00 sec)
			• The implementation mechanism of Boolean and serial in GaussDB is different from that in MySQL. Therefore, the default zero value in GaussDB is different from that in MySQL. For example:
			– Behavior in GaussDB
			gaussdb=# CREATE TABLE test(f1 SERIAL, f2 BOOL NOT NULL);
			NOTICE: CREATE TABLE will create implicit sequence "test_f1_seq" for serial column "test.f1"
			CREATE TABLE
			gaussdb=# INSERT IGNORE INTO test values(NULL,NULL);
			WARNING: null value in column "f1" violates not-null constraint
			DETAIL: Failing row contains (null, null).
			WARNING: null value in column "f2" violates not-null constraint
			DETAIL: Failing row contains (null, null).
			INSERT 0 1
			gaussdb=# SELECT * FROM test;
			f1 | f2
			----+----
			0 | f
			(1 row)
			– Behavior in MySQL
			mysql> CREATE TABLE test(f1 SERIAL, f2 BOOL NOT NULL);
			Query OK, 0 rows affected (0.00 sec)
			
			mysql> INSERT IGNORE INTO test values(NULL,NULL);
			Query OK, 1 row affected, 1 warning (0.00 sec)
			
			mysql> SELECT * FROM test;
			+----+----+
			| f1 | f2 |
			+----+----+
			| 1 | 0 |
			+----+----+
			1 row in set (0.00 sec)

2.7.3 DCL

Table 2-23 DCL syntax compatibility

No.	Description	Syntax	Difference
1	Set names with COLLATE specified.	SET [SESSION | LOCAL] NAMES {'charset_name' [COLLATE 'collation_name'] | DEFAULT};	GaussDB does not allow **charset_name** to be different from the database character set. For details, see "SQL Reference > SQL Syntax > S > SET" in *Developer Guide*.

2.8 Drivers

2.8.1 JDBC

2.8.1.1 JDBC API Reference

Obtaining Data from a Result Set

ResultSet objects provide a variety of methods to obtain data from a result set. Table 2-24 describes the common methods for obtaining data. If you want to know more about other methods, see JDK official documents.

Table 2-24 Common methods for obtaining data from a result set

Method	Description	Difference
int getInt(int columnIndex)	Obtains int data by column index.	-
int getInt(String columnLabel)	Obtains int data by column name.	-
String getString(int columnIndex)	Obtains string data by column index.	If the column type is integer and the column contains the **ZEROFILL** attribute, GaussDB pads 0s to meet the width required by the **ZEROFILL** attribute and outputs the result. MySQL directly outputs the result.

Method	Description	Difference
String getString(String columnLabel)	Obtains string data by column name.	If the column type is integer and the column contains the **ZEROFILL** attribute, GaussDB pads 0s to meet the width required by the **ZEROFILL** attribute and outputs the result. MySQL directly outputs the result.
Date getDate(int columnIndex)	Obtains date data by column index.	-
Date getDate(String columnLabel)	Obtains date data by column name.	-

3 MySQL Compatibility in M-compatible Mode

3.1 MySQL Compatibility Overview

This chapter compares the M-compatible mode in GaussDB with MySQL 5.7. Only compatibility features added later than GaussDB Kernel 505.2 are described. You are advised to view the specifications and restrictions of the features in *Developer Guide*.

GaussDB is compatible with MySQL in terms of data types, SQL functions, and database objects.

The execution plan, optimization, and EXPLAIN result in GaussDB are different from those in MySQL.

The underlying framework implementation of the GaussDB is different from that of MySQL. Therefore, there are still some differences between GaussDB and MySQL.

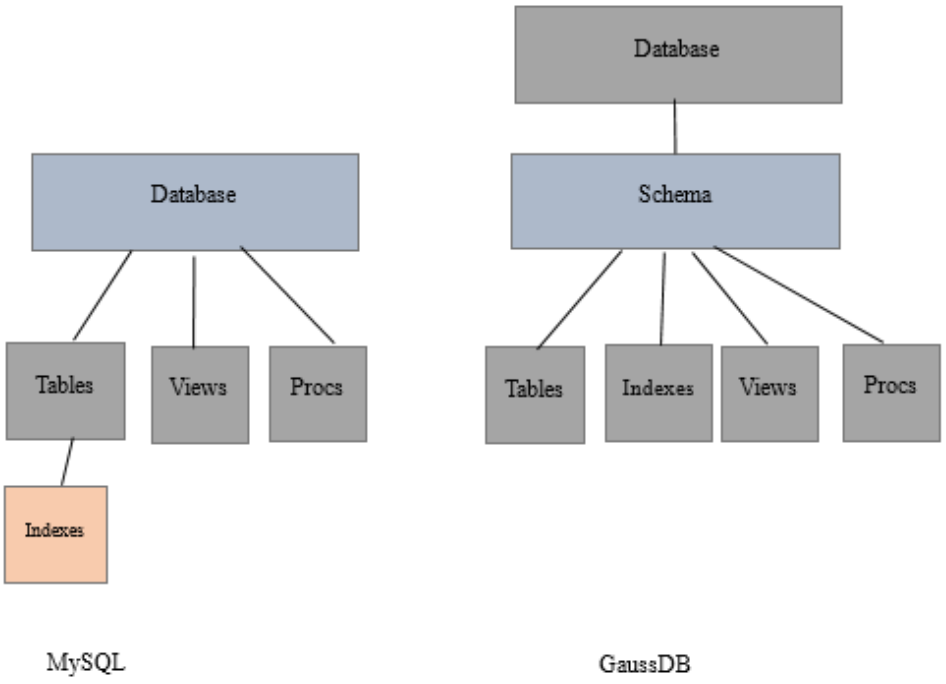
NOTE

The underlying architecture of GaussDB is different from that of MySQL. Therefore, the query performance of schemas with the same name as MySQL under information_schema and m_schema may be different. For details, see "Schema" in *M-Compatibility Developer Guide*. For example, the execution of the count function cannot be optimized. The time consumed by the SELECT * and SELECT COUNT(*) statements is similar.

Database and Schema Design

MySQL data objects include database, table, index, view, trigger, and proc. The mapping relationship between MySQL object layers and GaussDB is from top to bottom and one-to-many, as shown in the following figure.

Figure 3-1 Differences between databases and schemas in MySQL and GaussDB



- In MySQL, database and schema are synonyms. In GaussDB, a database can have multiple schemas. In this feature, each database in MySQL is mapped to a schema in GaussDB.
- In MySQL, an index belongs to a table. In GaussDB, an index belongs to a schema. As a result, an index name must be unique in a schema in GaussDB and must be unique in a table in MySQL. This difference will be retained as a current constraint.

3.2 Data Types

The data types of GaussDB are the same as those of MySQL in most function scenarios, but there are some differences.

- Unless otherwise specified, the precision, scale, and number of bits of some data types cannot be defined as floating-point values. You are advised to use valid integer values.

3.2.1 Numeric Data Types

Table 3-1 Integer types

No.	MySQL	GaussDB	Difference
1	BOOL	Supported, with differences	Output format: The output of SELECT TRUE/FALSE in GaussDB is **t** or **f**, and that in MySQL is **1** or **0**. MySQL: The BOOL/BOOLEAN type is actually mapped to the TINYINT type.
2	BOOLEAN	Supported, with differences	
3	TINYINT[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	For details, see the following note.
4	SMALLINT[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	For details, see the following note.
5	MEDIUMINT[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	MySQL requires 3 bytes to store MEDIUMINT data. ● The signed range is –8388608 to +8388607. ● The unsigned range is 0 to +16777215. GaussDB is mapped to the INT type. Four bytes are required for storage. The value range is determined based on boundary values. ● The signed range is –8388608 to +8388607. ● The unsigned range is 0 to +16777215. For other differences, see the following note.
6	INT[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	For details, see the following note.
7	INTEGER[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	For details, see the following note.

No.	MySQL	GaussDB	Difference
8	BIGINT[(M)] [UNSIGNED] [ZEROFILL]	Supported, with differences	For details, see the following note.

NOTE

Input formats:

- MySQL:

  If a character string with multiple decimal points (such as "1.2.3.4.5") is entered, MySQL will misparse the character string in loose mode, throw a warning, and insert the character string into the table successfully. For example, after "1.2.3.4.5" is inserted into the table, the value is **12**.

- GaussDB:

  If a character string with multiple decimal points (such as "1.2.3.4.5") is entered in loose mode, the characters after the second decimal point are truncated as invalid characters, a warning is thrown, and the character string is inserted into the table successfully. For example, after "1.2.3.4.5" is inserted into the table, the value is **1**. After "1.6.3.4.5" is inserted into the table, the value is **2**.

Table 3-2 Arbitrary precision types

No.	MySQL	GaussDB	Difference
1	DECIMAL[(M[,D])] [ZEROFILL]	Supported, with differences	MySQL decimal uses a 9 x 9 array to store values. The integer part and decimal part are stored separately. If the length exceeds the value, the decimal part is truncated first. GaussDB truncates an integer that contains more than 81 digits.
2	NUMERIC[(M[,D])] [ZEROFILL]	Supported, with differences	
3	DEC[(M[,D])] [ZEROFILL]	Supported, with differences	
4	FIXED[(M[,D])] [ZEROFILL]	Supported, with differences	

Table 3-3 Floating-point types

No.	MySQL	GaussDB	Difference
1	FLOAT[(M,D)] [ZEROFILL]	Supported, with differences	The FLOAT data type does not support partitioned tables with the key partitioning policy.

No.	MySQL	GaussDB	Difference
2	FLOAT(p) [ZEROFILL]	Supported, with differences	The FLOAT data type does not support partitioned tables with the key partitioning policy.
3	DOUBLE[(M,D)] [ZEROFILL]	Supported, with differences	The DOUBLE data type does not support partitioned tables with the key partitioning policy.
4	DOUBLE PRECISION[(M,D)] [ZEROFILL]	Supported, with differences	The DOUBLE PRECISION data type does not support partitioned tables with the key partitioning policy.
5	REAL[(M,D)] [ZEROFILL]	Supported, with differences	The REAL data type does not support partitioned tables with the key partitioning policy.

3.2.2 Date and Time Data Types

Table 3-4 Date and time data types

No.	MySQL	GaussDB	Difference
1	DATE	Supported, with differences.	GaussDB supports the date data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – Separator: A backslash (\) is regarded as an escape character in both MySQL and GaussDB. However, MySQL supports \0, but GaussDB does not support \0. Therefore, GaussDB reports an error when the backslash is used as a separator and the separator is followed by 0.
2	DATETIME[(fsp)]	Supported, with differences.	GaussDB supports the datetime data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – Separator: A backslash (\) is regarded as an escape character in both MySQL and GaussDB. However, MySQL supports \0, but GaussDB does not support \0. Therefore, GaussDB reports an error when the backslash is used as a separator and the separator is followed by 0.

No.	MySQL	GaussDB	Difference
3	TIMESTAMP[(fsp)]	Supported, with differences.	GaussDB supports the timestamp data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – Separator: A backslash (\) is regarded as an escape character in both MySQL and GaussDB. However, MySQL supports \0, but GaussDB does not support \0. Therefore, GaussDB reports an error when the backslash is used as a separator and the separator is followed by 0. ● Default value: – In MySQL 5.7, the default value of the **timestamp** column is the real time when data is inserted. Same as MySQL 8.0, GaussDB has no default value set for this column. That is, when **null** is inserted, the value is **null**.
4	TIME[(fsp)]	Supported, with differences.	GaussDB supports the time data type. Compared with MySQL, GaussDB has the following differences in specifications: ● Input formats: – Separator: A backslash (\) is regarded as an escape character in both MySQL and GaussDB. However, MySQL supports \0, but GaussDB does not support \0. Therefore, GaussDB reports an error when the backslash is used as a separator and the separator is followed by 0. ● When the hour, minute, second, and nanosecond of the time type are 0, the sign bits of GaussDB and MySQL may be different.
5	YEAR[(4)]	Supported.	-

NOTE

- GaussDB does not support ODBC syntax literals:

  { d 'str' }

  { t 'str' }

  { ts 'str' }
- GaussDB supports standard SQL literals, and precision can be added after type keywords, but MySQL does not support the following:

  DATE[(n)] 'str'

  TIME[(n)] 'str'

  TIMESTAMP[(n)] 'str'
- If you specify a precision for the DATETIME, TIME, or TIMESTAMP data type greater than the maximum precision supported by the data type, GaussDB truncates the precision to the maximum precision supported by the data type, whereas MySQL reports an error.

3.2.3 String Data Types

Table 3-5 String data types

No.	MySQL	GaussDB	Difference
1	CHAR(M)	Supported, with differences	• Input formats: – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty.

No.	MySQL	GaussDB	Difference
2	VARCHAR(M)	Supported, with differences	• Input formats: – The length of parameters and return values of GaussDB user-defined functions cannot be verified. The length of stored procedure parameters cannot be verified. However, MySQL supports these functions. – The length of temporary variables in GaussDB user-defined functions and stored procedures can be verified, and an error or truncation alarm is reported in strict or loose mode. However, MySQL does not support these functions. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty.

No.	MySQL	GaussDB	Difference
3	TINYTEXT	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the TINYTEXT type does not support primary keys, but GaussDB supports. • Index: In MySQL, the TINYTEXT type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation.

No.	MySQL	GaussDB	Difference
4	TEXT	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the TEXT type does not support primary keys, but GaussDB supports. • Index: In MySQL, the TEXT type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation.

No.	MySQL	GaussDB	Difference
5	MEDIUMTEXT	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the MEDIUMTEXT type does not support primary keys, but GaussDB supports. • Index: In MySQL, the MEDIUMTEXT type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation.

No.	MySQL	GaussDB	Difference
6	LONGTEXT	Supported, with differences	• Input formats: – GaussDB supports a maximum of 1 GB, and MySQL supports a maximum of 4 GB minus 1 byte. – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the LONGTEXT type does not support primary keys, but GaussDB supports. • Index: In MySQL, the LONGTEXT type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation.

3.2.4 Binary Data Types

Table 3-6 Binary data types

No.	MySQL	GaussDB	Difference
1	BINARY[(M)]	Supported, with differences	• Input formats: – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. – If the length of the inserted string is less than the target length, the padding character is 0x20 in GaussDB and 0x00 in MySQL. • Character set: The default character set is the initialized character set of the database. For MySQL, the default character set is BINARY. • Output formats: – When the JDBC protocol is used, a space at the end of the BINARY type is displayed as a space, and that in MySQL is displayed as \x00. – In loose mode, if characters (such as Chinese characters) of the BINARY type exceed *n* bytes, the excess characters will be truncated. MySQL retains the first *n* bytes. However, garbled characters are displayed in the output. – In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned. **NOTE** Due to the differences between GaussDB and MySQL in BINARY fillers and \0 truncation, GaussDB and MySQL have different performance in scenarios such as operator comparison calculation, character string-related system function calculation, index matching, and data import and export. For details about the difference scenarios, see the examples in this section.

No.	MySQL	GaussDB	Difference
2	VARBINARY(M)	Supported, with differences	• Input formats: – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Character set: The default character set is the initialized character set of the database. For MySQL, the default character set is BINARY. • Output formats: – When the JDBC protocol is used, a space at the end of the BINARY type is displayed as a space, and that in MySQL is displayed as \x00. – In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned.

No.	MySQL	GaussDB	Difference
3	TINYBLOB	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the TINYBLOB type does not support primary keys, but GaussDB supports. • Index: In MySQL, the TINYBLOB type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation. • Output formats: In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned.

No.	MySQL	GaussDB	Difference
4	BLOB	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the BLOB type does not support primary keys, but GaussDB supports. • Index: In MySQL, the BLOB type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation. • Output formats: In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned.

No.	MySQL	GaussDB	Difference
5	MEDIUMBLOB	Supported, with differences	• Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the MEDIUMBLOB type does not support primary keys, but GaussDB supports. • Index: In MySQL, the MEDIUMBLOB type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation. • Output formats: In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned.

No.	MySQL	GaussDB	Difference
6	LONGBLOB	Supported, with differences	• Value range: a maximum of 1 GB. MySQL supports a maximum of 4 GB minus 1 byte. • Input formats: – Default value: When creating a table column, you can set a default value in the syntax. MySQL does not allow you to set a default value. – After a binary or hexadecimal character string is entered, GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • Primary key: In MySQL, the LONGBLOB type does not support primary keys, but GaussDB supports. • Index: In MySQL, the LONGBLOB type does not support other index methods except prefix indexes. GaussDB supports these index methods. • Foreign key: In MySQL, the TINYTEXT type cannot be used as the referencing column or referenced column of a foreign key, but GaussDB supports this operation. • Output formats: In MySQL 8.0 and later versions, results starting with 0x are returned by default. In GaussDB, results in the format of "\x...\x...\x..." are returned.
7	BIT[(M)]	Supported, with differences	Output formats: • All outputs are displayed as binary character strings. MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty. • In MySQL 8.0 and later versions, 0 is added at the beginning of each result by default. In GaussDB, 0 is not added.

Example:

```
-- GaussDB
m_db=# CREATE TABLE test(a BINARY(10)) DISTRIBUTE BY REPLICATION;
```



```
CREATE TABLE
m_db=# INSERT INTO test VALUES(0x8000);
INSERT 0 1
m_db=# SELECT hex(a) FROM test;
        hex
----------------------
 80202020202020202020
(1 row)

m_db=# SELECT * FROM test WHERE hex(a) = 80000000000000000000;
 a
---
(0 rows)

m_db=# CREATE TABLE test2(a BINARY(10)) DISTRIBUTE BY REPLICATION;
CREATE TABLE
m_db=# INSERT INTO test2 VALUES(0x80008000);
INSERT 0 1
m_db=# SELECT hex(a) FROM test2;
        hex
----------------------
 80202020202020202020
(1 row)

m_db=# DROP TABLE test;
DROP TABLE
m_db=# DROP TABLE test2;
DROP TABLE

-- MySQL
mysql> CREATE TABLE test(a BINARY(10));
Query OK, 0 rows affected (0.01 sec)

mysql> INSERT INTO test VALUES(0x8000);
Query OK, 1 row affected (0.00 sec)

mysql> SELECT hex(a) FROM test;
+----------------------+
| hex(a)               |
+----------------------+
| 80000000000000000000 |
+----------------------+
1 row in set (0.00 sec)

mysql> SELECT * FROM test WHERE hex(a) = 80000000000000000000;
+------------+
| a          |
+------------+
| ▒          |
+------------+
1 row in set (0.00 sec)

mysql> CREATE TABLE test2(a binary(10));
Query OK, 0 rows affected (0.00 sec)

mysql> INSERT INTO test2 VALUES(0x80008000);
Query OK, 1 row affected (0.00 sec)

mysql> SELECT hex(a) FROM test2;
+----------------------+
| hex(a)               |
+----------------------+
| 80008000000000000000 |
+----------------------+
1 row in set (0.00 sec)
mysql> DROP TABLE test;
Query OK, 0 rows affected (0.00 sec)
mysql> DROP TABLE test2;
Query OK, 0 rows affected (0.00 sec)
```


3.2.5 Attributes Supported by Data Types

Table 3-7 Attributes supported by data types

No.	MySQL	GaussDB
1	NULL	Supported.
2	NOT NULL	Supported.
3	DEFAULT	Supported.
4	ON UPDATE	Supported.
5	PRIMARY KEY	Supported.
6	AUTO_INCREMENT	Supported.
7	CHARACTER SET name	Supported.
8	COLLATE name	Supported.
9	ZEROFILL	Supported.

When CREATE TABLE AS is used to create a table and default values are set for fields of the VARBINARY type, the command output of **SHOW CREATE TABLE**, **DESC**, or **\d** is different from that of MySQL. The value displayed in GaussDB is a hexadecimal value, but MySQL displays the original value.

Example:

```
m_db=# CREATE TABLE test_int(
       int_col INT
);
m_db=# CREATE TABLE test_varbinary(
       varbinary_col VARBINARY(20) default 'gauss'
) AS SELECT * FROM test_int;
m_db=# SHOW CREATE TABLE test_varbinary;
     Table      |                            Create Table
----------------+-------------------------------------------------------------------------------
 test_varbinary | SET search_path = public;                                                    +
                | CREATE TABLE test_varbinary (                                               +
                |     varbinary_col varbinary(20) DEFAULT X'6761757373',                      +
                |     int_col integer                                                         +
                | )                                                                           +
                | CHARACTER SET = "UTF8" COLLATE = "utf8mb4_general_ci"                       +
                | WITH (orientation=row, compression=no, storage_type=USTORE, segment=off);
(1 row)
m_db=# DROP TABLE test_int, test_varbinary;

mysql> CREATE TABLE test_int(
       int_col INT
);
mysql> CREATE TABLE test_varbinary(
       varbinary_col VARBINARY(20) default 'gauss'
) AS SELECT * FROM test_int;
mysql> SHOW CREATE TABLE test_varbinary;
+----------------
+-----------------------------------------------------------------------------------------------------------------------+
| Table          | Create
Table                                                                                                                 |
+----------------
```



```
+-----------------------------------------------------------------------------------------------------------------------------+
| test_varbinary | CREATE TABLE `test_varbinary` (
  `varbinary_col` varbinary(20) DEFAULT 'gauss',
  `int_vol` int(11) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 |
+----------------
+-----------------------------------------------------------------------------------------------------------------------------+
1 row in set (0.00 sec)
mysql> DROP TABLE test_int, test_varbinary;
```

3.2.6 Data Type Conversion

Conversion between different data types is supported. Data type conversion is involved in the following scenarios:

- The data types of operands of operators (such as comparison and arithmetic operators) are inconsistent. It is commonly used for comparison operations in query conditions or join conditions.
- The data types of arguments and parameters are inconsistent when a function is called.
- The data types of target columns to be updated by DML statements (including INSERT, UPDATE, MERGE, and REPLACE) and the defined column types are inconsistent.
- Explicit type conversion: CAST(expr AS datatype), which converts an expression to a data type.
- After the target data type of the final projection column is determined by set operations (UNION, MINUS, EXCEPT, and INTERSECT), the type of the projection column in each SELECT statement is inconsistent with the target data type.
- In other expression calculation scenarios, the target data type used for comparison or final result is determined based on the data type of different expressions.

There are three types of data type conversion differences: implicit conversion, explicit conversion, and UNION/CASE.

Differences in double colon conversion:

- In GaussDB, if you use double colons to convert input parameters of a function to another type, the result may be unexpected. In MySQL, double colons do not take effect.

  Example:

```
m_db=# SELECT POW("12"::VARBINARY,"12"::VARBINARY);
ERROR:  value out of range: overflow
CONTEXT:  referenced column: pow

varbinary col
m_db=# CREATE TABLE test_varbinary (
        A VARBINARY(10)
);
m_db=# INSERT INTO test_varbinary VALUES ('12');
m_db=# SELECT POW(A, A) FROM test_varbinary;
      pow
----------------
 8916100448256
(1 row)
```

Differences in implicit type conversion:

- In GaussDB, the conversion rules from small types to small types are used. In MySQL, the conversion rules from small types to large types and from large types to small types are used.
- Due to data type differences, some output formats of implicit conversion in GaussDB are inconsistent.
- During implicit conversion from the BIT data type to the character data type and binary data type in GaussDB, some output behaviors are inconsistent. GaussDB outputs a hexadecimal character string, and MySQL escapes the character string based on the ASCII code table. If the character string cannot be escaped, the output is empty.

  Example:

```
m_db=# CREATE TABLE bit_storage (
    VS_COL1 BIT(4),
    VS_COL2 BIT(4),
    VS_COL3 BIT(4),
    VS_COL4 BIT(4),
    VS_COL5 BIT(4),
    VS_COL6 BIT(4),
    VS_COL7 BIT(4),
    VS_COL8 BIT(4)
) DISTRIBUTE BY REPLICATION;
m_db=# CREATE TABLE string_storage (
    VS_COL1 BLOB,
    VS_COL2 TINYBLOB,
    VS_COL3 MEDIUMBLOB,
    VS_COL4 LONGBLOB,
    VS_COL5 TEXT,
    VS_COL6 TINYTEXT,
    VS_COL7 MEDIUMTEXT,
    VS_COL8 LONGTEXT
) DISTRIBUTE BY REPLICATION;
m_db=# INSERT INTO bit_storage VALUES(B'101', B'101', B'101', B'101', B'101', B'101', B'101', B'101');
m_db=# INSERT INTO string_storage SELECT * FROM bit_storage;
m_db=# SELECT * FROM string_storage;
 VS_COL1 | VS_COL2 | VS_COL3 | VS_COL4 | VS_COL5 | VS_COL6 | VS_COL7 | VS_COL8
---------+---------+---------+---------+---------+---------+---------+---------
 \x05    | \x05    | \x05    | \x05    | \x05    | \x05    | \x05    | \x05
(1 row)
m_db=# DROP TABLE bit_storage, string_storage;

mysql> CREATE TABLE bit_storage (
    VS_COL1 BIT(4),
    VS_COL2 BIT(4),
    VS_COL3 BIT(4),
    VS_COL4 BIT(4),
    VS_COL5 BIT(4),
    VS_COL6 BIT(4),
    VS_COL7 BIT(4),
    VS_COL8 BIT(4)
);
mysql> CREATE TABLE bit_storage (
    VS_COL1 BIT(4),
    VS_COL2 BIT(4),
    VS_COL3 BIT(4),
    VS_COL4 BIT(4),
    VS_COL5 BIT(4),
    VS_COL6 BIT(4),
    VS_COL7 BIT(4),
    VS_COL8 BIT(4)
);
mysql> INSERT INTO bit_storage VALUES(B'101', B'101', B'101', B'101', B'101', B'101', B'101', B'101');
mysql> INSERT INTO string_storage SELECT * FROM bit_storage;
mysql> SELECT * FROM string_storage;
+---------+---------+---------+---------+---------+---------+---------+---------+
| VS_COL1 | VS_COL2 | VS_COL3 | VS_COL4 | VS_COL5 | VS_COL6 | VS_COL7 | VS_COL8 |
```



```
+---------+---------+---------+---------+---------+---------+---------+---------+
|         |         |         |         |         |         |         |         |
+---------+---------+---------+---------+---------+---------+---------+---------+
1 row in set (0.00 sec)
mysql> DROP TABLE bit_storage, string_storage;
```

- When a binary or hexadecimal character string with 0x00 is inserted into the binary data type, GaussDB inserts part of the string and truncates the characters following 0x00. MySQL can insert the entire string.

  Example:

```
m_db=# CREATE TABLE blob_storage (
        A BLOB
) DISTRIBUTE BY REPLICATION;
m_db=# INSERT INTO blob_storage VALUES (0xBB00BB);
m_db=# SELECT hex(A) FROM blob_storage;
 hex
-----
 BB
(1 row)
m_db=# DROP TABLE blob_storage;

mysql> CREATE TABLE blob_storage (
        A BLOB
);
mysql> INSERT INTO blob_storage VALUES (0xBB00BB);
mysql> SELECT hex(A) FROM blob_storage;
+--------+
| hex(a) |
+--------+
| BB00BB |
+--------+
1 row in set (0.01 sec)
mysql> DROP TABLE blob_storage;
```

- When a binary or hexadecimal string with 0x00 in the middle is inserted into the string data type, GaussDB inserts part of the string and truncates the characters following 0x00. In MySQL, the string cannot be inserted in strict mode, and an empty string is inserted in loose mode.

  Example:

```
m_db=# CREATE TABLE text_storage (
        A TEXT
);
m_db=# INSERT INTO text_storage VALUES (b'1011101100000000010111011');
m_db=# SELECT hex(A) FROM text_storage;
 hex
-----
 BB
(1 row)
m_db=# DROP TABLE text_storage;

mysql> CREATE TABLE text_storage (
        A TEXT
);
mysql> INSERT INTO text_storage VALUES (b'1011101100000000010111011');
ERROR 1366 (HY000): Incorrect string value: '\xBB\x00\xBB' for column 'A' at row 1
mysql> SELECT hex(A) FROM text_storage;
Empty set (0.00 sec)
mysql> SET SQL_MODE='';
mysql> INSERT INTO text_storage VALUES (b'1011101100000000010111011');
mysql> SELECT hex(A) FROM text_storage;
+--------+
| hex(A) |
+--------+
|        |
+--------+
1 row in set (0.01 sec)
mysql> DROP TABLE text_storage;
```


- The WHERE clause contains only common character strings. GaussDB returns **TRUE** for **'t'**, **'true'**, **'yes'**, **'y'**, and **'on'**, returns **FALSE** for **'no'**, **'f'**, **'off'**, **'false'**, and **'n'**, and reports an error for other character strings. MySQL determines whether to return **TRUE** or **FALSE** by converting a character string to an INT1 value.

  Example:

```
m_db=# CREATE TABLE test_where (
       A INT
);
m_db=# INSERT INTO test_where VALUES (1);
m_db=# SELECT * FROM test_where WHERE '111';
ERROR:  invalid input syntax for type boolean: "111"
LINE 1: select * from test_where where '111';
m_db=# DROP TABLE test_where;

mysql> CREATE TABLE test_where (
       A INT
);
mysql> INSERT INTO test_where VALUES (1);
mysql> SELECT * FROM test_where WHERE '111';
+------+
| a    |
+------+
|    1 |
+------+
1 row in set (0.01 sec)
mysql> DROP TABLE test_where;
```

- When converting strings of the YEAR type to integers, MySQL uses scientific notation, but GaussDB does not support scientific notation and truncates the strings.

  Example:

```
m_db=# CREATE TABLE test_year (
       A YEAR
);
m_db=# SET sql_mode = '';
m_db=# INSERT INTO test_year VALUES ('2E3x');
WARNING:  Data truncated for column.
LINE 1: insert into t1 values ('2E3x');
                               ^
CONTEXT:  referenced column: a
m_db=# SELECT * FROM test_year ORDER BY A;
  a
------
 2002
(1 row)
m_db=# DROP TABLE test_year;

mysql> CREATE TABLE test_year (
       A YEAR
);
mysql> INSERT INTO test_year VALUES ('2E3x');
mysql> SELECT * FROM test_year ORDER BY A;
+------+
| a    |
+------+
| 2000 |
+------+
1 row in set (0.01 sec)
mysql> DROP TABLE test_year;
```

Differences in explicit type conversion:

- In GaussDB, the conversion rules for each target type are used. In MySQL, C++ polymorphic overloading functions are used, causing inconsistent behavior in nesting scenarios.

  Example:

```
m_db=# SELECT CAST(GREATEST(date'2023-01-01','2023-01-01') AS SIGNED);
WARNING:  Truncated incorrect INTEGER value: '2023-01-01'
CONTEXT:  referenced column: cast
 cast
------
 2023
(1 row)

mysql> SELECT CAST(GREATEST(date'2023-01-01','2023-01-01') AS SIGNED);
+-----------------------------------------------------------+
| CAST(GREATEST(date'2023-01-01','2023-01-01') AS SIGNED) |
+-----------------------------------------------------------+
|                                          20230101 |
+-----------------------------------------------------------+
```

Differences between UNION, CASE, and related structures:

- In MySQL, POLYGON+NULL, POINT+NULL, and POLYGON+POINT return the GEOMETRY type. They are not involved in GaussDB and considered as errors.
- The SET and ENUM types are not supported currently and are considered as errors.
- When the constant type is aggregated with other types, the precision of the output type is the precision of other types. For example, the precision of the result of "select "helloworld" union select p from t;" is the precision of attribute p.
- When fixed-point constants and types without precision constraints (non-string types such as int, bool, and year, and the type of the aggregation result is the fixed-point type) are aggregated, the precision constraint is output based on the default precision 31 of fixed-point numbers.
- Differences in merge rules:

  In MySQL 5.7, if YEAR is aggregated with TINYINT, INT, MEDIUMINT, BIGINT, or BOOL, the result is of the type with UNSIGNED. In GaussDB, it is of the type without UNSIGNED. In MySQL, if BIT is aggregated with a numeric type such as INT, NUMERIC, FLOAT, or DOUBLE, the result type is VARBINARY. In GaussDB, the result type is NUMERIC for aggregation between BIT and INT or NUMERIC, DOUBLE for aggregation between BIT and FLOAT or DOUBLE, and UINT8 for aggregation between BIT and unsigned integers.
- In MySQL, BINARY and CHAR use different padding characters. BINARY is padded with '\0', and CHAR is padded with spaces. In GaussDB, BINARY and CHAR are padded with spaces.

3.3 System Functions

GaussDB is compatible with most MySQL system functions, but there are some differences. Only system functions in M-compatible mode can be used. System functions of the original GaussDB cannot be used in case of unexpected results. Currently, some system functions in GaussDB with the same names as those in MySQL are not supported in M-compatible mode. For some of them, the message indicating that they are not supported in M-compatible mode is displayed. Other functions still retain the behaviors of the original GaussDB system functions. Do

not use these functions in case of unexpected results. The following table lists the functions with the same name.

Table 3-8 Same-name functions for which a message indicating that they are not supported in M-compatible mode is displayed

cot	isEmpty	last_insert_id	mod	octet_length
overlaps	point	radians	regexp_instr	regexp_like
regexp_replace	regexp_substr	stddev_pop	stddev_samp	var_pop
var_samp	variance	-	-	-

Table 3-9 Same-name functions that retain the behaviors of the original GaussDB system functions in M-compatible mode

ceil	decode	encode	format	instr
position	round	stddev	row_num	-

NOTE

- MySQL allows you to add user-defined functions to the database through the loadable functions. When such functions are called, aliases can be specified in the input parameters of the functions. GaussDB does not support loadable functions. When a function is called, aliases cannot be specified for input parameters of the function.
- In M-compatible mode, system functions have the following common differences:
  - The return value type of a system function is the same as that of MySQL only when the node type of the input parameter is Var (table data) or Const (constant input). In other cases (for example, the input parameter is a calculation expression or function expression), the return value type may be different from that of MySQL.
  - When an aggregate function uses an expression such as another function, operator, or SELECT clause as the input parameter (for example, **SELECT sum(abs(n)) FROM t;**), the aggregate function cannot obtain the precision transferred by the input parameter expression. As a result, the precision of the function result is different from that of MySQL.
  - Calling system functions by pg_catalog.func_name() is not recommended. If the called function has input parameters in the format of syntax (such as SELECT substr('demo' from 1 for 2)), an error may occur when the function is called.

3.3.1 Flow Control Functions

Table 3-10 Flow control functions

No.	MySQL	GaussDB	Difference
1	IF()	Supported.	If the first parameter is **TRUE** and the third parameter expression contains an implicit type conversion error, or if the first parameter is **FALSE** and the second parameter expression contains an implicit type conversion error, MySQL ignores the error while GaussDB displays a type conversion error.
2	IFNULL()	Supported.	If the first parameter is not **NULL** and the expression of the second parameter contains an implicit type conversion error, MySQL ignores the error while GaussDB displays a type conversion error.
3	NULLIF()	Supported, with differences.	The return value type of a function differs in MySQL 5.7 and MySQL 8.0. Return types are compatible with MySQL 8.0 because it is more appropriate.

3.3.2 Date and Time Functions

NOTE

The following describes the date and time functions in M-compatible GaussDB:

- Functions listed in "Functions and Operators" in *M-Compatibility Developer Guide* may use time expressions in their input parameters.

  Time expressions (mainly including TEXT, DATETIME, DATE, and TIME) and the types that can be implicitly converted to time expressions can be used as input parameters. For example, a number can be implicitly converted to text and then used as a time expression.

  However, time expressions varies depending on functions. For example, the DATEDIFF function is used to calculate only the date difference. Therefore, its time expression is parsed as date. The TIMESTAMPDIFF function is used to calculate the time difference based on UNIT. Therefore, its time expression may be parsed as DATE, TIME, or DATETIME based on UNIT.

- The input parameters of functions may contain an invalid date.

  Generally, the supported DATE and DATETIME ranges are the same as those in MySQL. The value of DATE ranges from '0000-01-01' to '9999-12-31', and the value of DATETIME ranges from '0000-01-01 00:00:00' to '9999-12-31 23:59:59'. Although GaussDB supports larger ranges, dates beyond the MySQL ranges are still considered invalid.

Time functions may trigger alarms and return NULL unless the input parameters can be properly converted into dates by CAST.

In the new framework, most date and time functions in GaussDB are the same as those in MySQL. The following table lists the differences between some functions.

Table 3-11 Date and time functions

No.	MySQL	GaussDB	Difference
1	ADDDATE()	Supported	-
2	ADDTIME()	Supported	-
3	CONVERT_TZ()	Supported	-
4	CURDATE()	Supported	-
5	CURRENT_DATE()/ CURRENT_DATE	Supported	-
6	CURRENT_TIME()/ CURRENT_TIME	Supported, with differences.	The integer value of a MySQL input parameter is wrapped when it reaches **255** (maximum value of a one-byte integer value), for example, **SELECT CURRENT_TIME(257) == SELECT CURRENT_TIME(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
7	CURRENT_TIMESTAMP()/ CURRENT_TIMESTAMP	Supported, with differences.	The integer value of a MySQL input parameter is wrapped when it reaches **255**, for example, **SELECT CURRENT_TIMESTAMP(257) == SELECT CURRENT_TIMESTAMP(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
8	CURTIME()	Supported, with differences.	The integer value of a MySQL input parameter is wrapped when it reaches **255**, for example, **SELECT CURTIME(257) == SELECT CURTIME(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
9	DATE()	Supported	-

No.	MySQL	GaussDB	Difference
10	DATE_ADD()	Supported	-
11	DATE_FORMAT()	Supported	-
12	DATE_SUB()	Supported	-
13	DATEDIFF()	Supported	-
14	DAY()	Supported	-
15	DAYNAME()	Supported	-
16	DAYOFMONTH()	Supported	-
17	DAYOFWEEK()	Supported	-
18	DAYOFYEAR()	Supported	-
19	EXTRACT()	Supported	-
20	FROM_DAYS()	Supported	-
21	FROM_UNIXTIME()	Supported	-
22	GET_FORMAT()	Supported	-
23	HOUR()	Supported	-
24	LAST_DAY()	Supported	-
25	LOCALTIME()/ LOCALTIME	Supported, with differences.	The integer value of a MySQL input parameter is wrapped when it reaches **255**, for example, **SELECT LOCALTIME(257) == SELECT LOCALTIME(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.

No.	MySQL	GaussDB	Difference
26	LOCALTIMESTAMP/ LOCALTIMESTAMP()	Supported, with differences.	The integer value of a MySQL input parameter is wrapped based on the maximum value **255** of one byte, for example, **SELECT LOCALTIMESTAMP(257) == SELECT LOCALTIMESTAMP(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
27	MAKEDATE()	Supported	-
28	MAKETIME()	Supported	In the distributed pushdown scenario, if no second precision is specified for the TIME type, MySQL supplements six trailing zeros by default, but GaussDB does not supplement anything.
29	MICROSECOND()	Supported	-
30	MINUTE()	Supported	-
31	MONTH()	Supported	-
32	MONTHNAME()	Supported	-
33	NOW()	Supported, with differences.	The integer value of a MySQL input parameter is wrapped when it reaches **255**, for example, **SELECT NOW(257)==SELECT NOW(1)**. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.

No.	MySQL	GaussDB	Difference
34	PERIOD_ADD()	Supported, with differences.	1. Processing of integer overflow. In MySQL 5.7, the maximum value of an input parameter result of this function is 2^32=4294967296. When the accumulated value of the month corresponding to **period** and the **month_number** in the input parameter or result exceed the uint32 range, integer wraparound occurs. This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0. 2. Performance of negative **period**. In MySQL 5.7, a negative year is parsed as an abnormal value instead of an error. An error is reported when a GaussDB input parameter or result is negative (for example, January 100 minus 10000 months). This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0. 3. Signs that the month in **period** exceeds the range. In MySQL 5.7, if the month is greater than 12 or equal to **0**, for example, **200013** or **199900**, it will be postponed correspondingly to a later year or the 0th month will be processed as December of the previous year. GaussDB reports an error for months beyond the range. This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0.

No.	MySQL	GaussDB	Difference
35	PERIOD_DIFF()	Supported, with differences.	1. Behaviors of integer overflow processing. In MySQL 5.7, the maximum value of an input parameter result of this function is 2^32=4294967296. When the accumulated value of the month corresponding to **period** and the **month_number** in the input parameter or result exceed the uint32 range, integer wraparound occurs. This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0. 2. Signs of negative **period**. In MySQL 5.7, a negative year is parsed as an abnormal value instead of an error. An error is reported when a GaussDB input parameter or result is negative (for example, January 100 minus 10000 months). This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0. 3. Signs that the month in **period** exceeds the range. In MySQL 5.7, if the month is greater than 12 or equal to **0**, for example, **200013** or **199900**, it will be postponed correspondingly to a later year or the 0th month will be processed as December of the previous year. GaussDB reports an error for months beyond the range. This issue has been resolved in MySQL 8.0. The performance of this function in GaussDB is the same as that in MySQL 8.0.
36	QUARTER()	Supported	-
37	SEC_TO_TIME()	Supported	-
38	SECOND()	Supported	-

No.	MySQL	GaussDB	Difference
39	STR_TO_DATE()	Supported	Return value difference: In GaussDB, text is returned. In MySQL, datetime or date is returned.
40	SUBDATE()	Supported	-
41	SUBTIME()	Supported	-
42	SYSDATE()	Supported, with differences.	The integer value of the MySQL input parameter is wrapped when reaching the maximum value **255** by one byte. GaussDB does not support wraparound.
43	TIME()	Supported	-
44	TIME_FORMAT()	Supported	-
45	TIME_TO_SEC()	Supported	-
46	TIMEDIFF()	Supported	-
47	TIMESTAMP()	Supported	-
48	TIMESTAMPADD()	Supported	-
49	TIMESTAMPDIFF()	Supported	-
50	TO_DAYS()	Supported	-
51	TO_SECONDS()	Supported	-

No.	MySQL	GaussDB	Difference
52	UNIX_TIMESTAMP()	Supported	MySQL determines whether to return a fixed-point value or an integer based on whether an input parameter contains decimal places. When operators or functions are nested in the input parameter, GaussDB may return a value of the type different from that in MySQL. If the inner node returns a value of the fixed-point, floating-point, string, or time type (excluding the DATE type), MySQL may return an integer, and GaussDB returns a fixed-point value.
53	UTC_DATE()	Supported	-
54	UTC_TIME()	Supported, with differences.	The integer value of a MySQL input parameter is wrapped based on the maximum value **255** of one byte. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
55	UTC_TIMESTAMP()	Supported, with differences.	The integer value of a MySQL input parameter is wrapped based on the maximum value **255** of one byte. GaussDB supports only valid values ranging from 0 to 6. For other values, an error is reported.
56	WEEK()	Supported	-
57	WEEKDAY()	Supported	-
58	WEEKOFYEAR()	Supported	-
59	YEAR()	Supported	-
60	YEARWEEK()	Supported	-

3.3.3 String Functions

Table 3-12 String functions

No.	MySQL	GaussDB	Difference
1	ASCII()	Supported.	-
2	BIT_LENGTH()	Supported.	-
3	CHAR_LENGTH()	Supported, with differences.	In GaussDB, if the character set is SQL_ASCII, CHAR_LENGTH() returns the number of bytes instead of characters.
4	CHARACTER_LENGTH()	Supported, with differences.	In GaussDB, if the character set is SQL_ASCII, CHARACTER_LENGTH() returns the number of bytes instead of characters.
5	CONCAT()	Supported.	For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
6	CONCAT_WS()	Supported.	For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
7	HEX()	Supported.	-
8	LENGTH()	Supported.	-

No.	MySQL	GaussDB	Difference
9	LPAD()	Supported, with differences.	• The default maximum padding length in MySQL is **1398101**, and that in GaussDB is **1048576**. The maximum padding length varies depending on the character set. For example, if the character set is GBK, the default maximum padding length in GaussDB is **2097152**. • If the database character set is SQL_ASCII, unexpected results may occur. • For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
10	REPEAT()	Supported.	For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
11	REPLACE()	Supported.	For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.

No.	MySQL	GaussDB	Difference
12	RPAD()	Supported, with differences.	• The default maximum padding length in MySQL is **1398101**, and that in GaussDB is **1048576**. The maximum padding length depends on the character set. For example, if the character set is GBK, the default maximum padding length in GaussDB is **2097152**. • If the database character set is SQL_ASCII, unexpected results may occur. • For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
13	SPACE()	Supported.	-
14	STRCMP()	Supported, with differences.	If the database character set is SQL_ASCII, unexpected results may occur.
15	FIND_IN_SET()	Supported, with differences.	When characters are specified to be encoded in SQL_ASCII for the database, the server parses byte values 0 to 127 according to the ASCII standard, and byte values 128 to 255 cannot be parsed. If the input and output of the function contain any non-ASCII characters, the database cannot convert or verify them. For binary return values, MySQL offers various options (including BINARY, VARBINARY, and BLOB), while GaussDB offers only one—LONGBLOB. For non-binary return values, MySQL offers various options (including CHAR, VARCHAR, and TEXT), while GaussDB only offers TEXT.
16	LCASE()		
17	LEFT()		
18	LOWER()		
19	LTRIM()		
20	REVERSE()		
21	RIGHT()		
22	RTRIM()		
23	SUBSTR()		
24	SUBSTRING()		
25	SUBSTRING_INDEX()		
26	TRIM()		
27	UCASE()		
28	UPPER()		

No.	MySQL	GaussDB	Difference
29	UNHEX()	Supported.	The return value type in MySQL may be BINARY, VARBINARY, BLOB, MEDIUMBLOB, or LONGBLOB, while the return value type in GaussDB is fixed to LONGBLOB.
30	FIELD()	Supported.	-
31	FORMAT()	Supported.	-

3.3.4 Forced Conversion Functions

Table 3-13 Forced conversion functions

No.	MySQL	GaussDB	Difference

1	CAST()	Supported	• In GaussDB, CAST(expr AS CHAR[(N)] charset_info or CAST(expr AS NCHAR[(N)]) cannot be used to convert character sets.
			• In GaussDB, you can use **CAST(expr AS FLOAT[(p)])** or **CAST(expr AS DOUBLE)** to convert an expression to the one of the floating-point type. MySQL 5.7 does not support this conversion.
			• In GaussDB, CAST(expr AS JSON) cannot be used to convert expressions to JSON.
			• In the CAST nested subquery scenario, if the subquery statement returns the FLOAT type, an accurate value is returned in GaussDB while a distorted value is returned in MySQL 5.7. The same rule applies to the BINARY function implemented using CAST.
			--GaussDB
			m_db=# CREATE TABLE sub_query_table (myfloat float) DISTRIBUTE BY REPLICATION;
			CREATE TABLE
			m_db=# INSERT INTO sub_query_table (myfloat) VALUES (1.23);
			INSERT 0 1
			m_db=# SELECT BINARY (select MyFloat from sub_query_table) from sub_query_table;
			binary
			-------- 	
			1.23
			(1 row)
			m_db=# SELECT CAST((select MyFloat from sub_query_table) AS char);
			cast
			------ 	
			1.23
			(1 row)
			--Mysql 5.7
			mysql> CREATE TABLE sub_query_table (myfloat float);
			Query OK, 0 rows affected (0.02 sec)
			mysql> INSERT INTO sub_query_table (myfloat) VALUES (1.23);
			Query OK, 1 row affected (0.00 sec)
			mysql> SELECT BINARY (select MyFloat from sub_query_table) from sub_query_table;
			+--+
			| BINARY (select MyFloat from sub_query_table) |
			+--+
			| 1.2300000190734863 |
			+--+

No.	MySQL	GaussDB	Difference
			1 row in set (0.00 sec) mysql> SELECT CAST((select MyFloat from sub_query_table) AS char); +----------+ | CAST((select MyFloat from sub_query_table) AS char) | +----------+ | 1.2300000190734863 | +----------+ 1 row in set (0.00 sec)
2	CONVERT()	Supported	• In GaussDB, CONVERT(expr, CHAR[(N)] charset_info or CAST(expr, NCHAR[(N)]) cannot be used to convert character sets. • In GaussDB, you can use **CONVERT(expr, FLOAT[(p)])** or **CONVERT(expr, DOUBLE)** to convert an expression to the one of the floating-point type. MySQL 5.7 does not support this conversion. • In GaussDB, CONVERT(expr, JSON) cannot be used to convert expressions to JSON.

3.3.5 Encryption Functions

Table 3-14 Encryption functions

No.	MySQL	GaussDB	Difference
1	AES_DECRYPT()	Supported.	1. GaussDB does not support ECB mode, which is an insecure encryption mode, but uses CBC mode by default. 2. When characters are specified to be encoded in SQL_ASCII for GaussDB, the server parses byte values 0 to 127 according to the ASCII standard, and byte values 128 to 255 cannot be parsed. If the input and output of the function contain any non-ASCII characters, the database cannot help you convert or verify them. 3. The return value type in MySQL is BINARY, VARBINARY, BLOB, MEDIUMBLOB, or LONGBLOB, while the return value type in GaussDB is fixed to LONGBLOB.
2	AES_ENCRYPT()	Supported.	
3	SHA()/ SHA1()	Supported.	-

No.	MySQL	GaussDB	Difference
4	SHA2()	Supported.	-

3.3.6 Comparison Functions

Table 3-15 Comparison functions

No.	MySQL	GaussDB	Difference
1	COALESCE()	Supported, with differences.	In the union distinct scenario, the precision of the return value is different from that in MySQL. If there is an implicit type conversion error in the subsequent parameter expression of the first parameter that is not **NULL**, MySQL ignores the error while GaussDB displays a type conversion error. When the parameter is a MIN or MAX function, the return value type is different from that in MySQL.
2	INTERVAL()	Supported.	-
3	GREATEST()	Supported, with differences.	If the return value type in MySQL is binary string (such as BINARY, VARBINARY, or BLOB), the return value type in GaussDB is LONGBLOB. If the return value type in MySQL is non-binary string (such as CHAR, VARCHAR, or TEXT), the return value type in GaussDB is TEXT. If the input parameter of the function contains **NULL** and the function is called after the WHERE keyword, the returned result is inconsistent with that of MySQL 5.7. This problem lies in MySQL 5.7. Since MySQL 8.0 has resolved this problem, GaussDB are consistent with MySQL 8.0.
4	LEAST()	Supported, with differences.	If the return value type in MySQL is binary string (such as BINARY, VARBINARY, or BLOB), the return value type in GaussDB is LONGBLOB. If the return value type in MySQL is non-binary string (such as CHAR, VARCHAR, or TEXT), the return value type in GaussDB is TEXT. If the input parameter of the function contains **NULL** and the function is called after the WHERE keyword, the returned result is inconsistent with that of MySQL 5.7. This problem lies in MySQL 5.7. Since MySQL 8.0 has resolved this problem, GaussDB are consistent with MySQL 8.0.

No.	MySQL	GaussDB	Difference
5	ISNULL()	Supported.	-

3.3.7 Aggregate Functions

Table 3-16 Aggregate functions

No.	MySQL	GaussDB	Difference
1	AVG()	Supported, with differences.	• In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed. • In GaussDB, if the columns in **expr** are of the BIT, BOOL, or integer type and the sum of all rows exceeds the range of BIGINT, overflow occurs, reversing integers.
2	BIT_AND()	Supported.	-
3	BIT_OR()	Supported.	-
4	BIT_XOR()	Supported.	-
5	COUNT()	Supported, with differences.	In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed.

No.	MySQL	GaussDB	Difference
6	GROUP_CONCAT()	Supported, with differences.	• In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed. • In GaussDB, if the parameters in GROUP_CONCAT contain both the DISTINCT and ORDER BY syntaxes, all expressions following ORDER BY must be in the DISTINCT expression. • In GaussDB, **GROUP_CONCAT(... ORDER BY** *Number***)** does not indicate the sequence of the parameter. The number is only a constant expression, which is equivalent to no sorting. • In GaussDB, the **group_concat_max_len** parameter is used to limit the maximum return length of GROUP_CONCAT. If the return length exceeds the maximum, the length is truncated. Currently, the maximum length that can be returned is **1073741823**, which is smaller than that in MySQL.
7	MAX()	Supported, with differences.	In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed. When the parameter is not a table field, the return value type of the MAX function is different from that of MySQL 5.7.
8	MIN()	Supported, with differences.	In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed. When the parameter is not a table field, the return value type of the MIN function is different from that of MySQL 5.7.
9	SUM()	Supported, with differences.	• In GaussDB, if **DISTINCT** is specified and the SQL statement contains a GROUP BY clause, the result sequence is not guaranteed. • In GaussDB, if the columns in **expr** are of the BIT, BOOL, or integer type and the sum of all rows exceeds the range of BIGINT, overflow occurs, reversing integers.

3.3.8 Arithmetic Functions

Table 3-17 Arithmetic functions

No.	MySQL	GaussDB	Difference
1	ABS()	Supported.	-
2	ACOS()	Supported.	-
3	ASIN()	Supported.	-
4	ATAN()	Supported.	-
5	ATAN2()	Supported.	-
6	CEILING()	Supported.	Some operation result types are inconsistent with those in MySQL. If the derived result is of the NUMERIC or integer type and can be stored as an integer type, the result type in MySQL is integer, but is still NUMERIC in GaussDB.
7	COS()	Supported.	-
8	DEGREES()	Supported.	-
9	EXP()	Supported.	-
10	FLOOR()	Supported, with differences.	The return value types of the FLOOR function in GaussDB are different from those in MySQL. When the input parameter type is INT, the return value type is BIGINT in GaussDB, but is INT in MySQL. Some operation result types are inconsistent with those in MySQL. If the derived result is of the NUMERIC or integer type and can be stored as an integer type, the result type in MySQL is integer, but is still NUMERIC in GaussDB.
11	LN()	Supported.	-
12	LOG()	Supported.	-
13	LOG10()	Supported.	-
14	LOG2()	Supported.	-

No.	MySQL	GaussDB	Difference
15	PI()	Supported.	The precision of the return value of the PI function in GaussDB is different from that in MySQL. It is rounded off to 15 decimal places in GaussDB but to six decimal places in MySQL.
16	POW()	Supported.	-
17	POWER()	Supported.	-
18	RAND()	Supported.	-
19	SIGN()	Supported.	-
20	SIN()	Supported.	-
21	SQRT()	Supported.	-
22	TAN()	Supported.	-
23	TRUNCATE()	Supported.	-
24	CEIL()	Supported.	-

3.3.9 Other Functions

Table 3-18 Other functions

No.	MySQL	GaussDB	Difference
1	DATABASE()	Supported.	-
2	UUID()	Supported.	-
3	UUID_SHORT()	Supported.	-

3.4 Operators

GaussDB is compatible with most MySQL operators, but there are some differences. If they are not listed, the operator behavior is the native behavior of GaussDB by default. Currently, there are statements that are not supported by MySQL but supported by GaussDB. You are advised not to use these statements.

Operator Differences

- NULL values in ORDER BY are sorted in different ways. MySQL sorts NULL values first, while GaussDB sorts NULL values last. In GaussDB, **nulls first** and **nulls last** can be used to set the sorting sequence of NULL values.
- If ORDER BY is used, the output sequence of GaussDB is the same as that of MySQL. Without ORDER BY, GaussDB does not guarantee that the results are ordered.
- MySQL operators must use parentheses to strictly combine expressions. Otherwise, an error is reported. For example, SELECT 1 regexp ('12345' regexp '123').

  The GaussDB M-compatible operators can be successfully executed without using parentheses to strictly combine expressions.
- NULL values are displayed in different ways. MySQL displays a NULL value as **"NULL"**. GaussDB displays a NULL value as empty.

  MySQL output:

  ```
  mysql> Select NULL;
  +------+
  | NULL |
  +------+
  | NULL |
  +------+
  1 row in set (0.00 sec)
  ```

  GaussDB output:

  ```
  m_db=# select NULL;
   ?column?
  ----------

  (1 row)
  ```
- After the operator is executed, the column names are displayed in different ways. MySQL displays a NULL value as **"NULL"**. GaussDB displays a NULL value as empty.
- When character strings are being converted to the double type but there is an invalid one, the alarm is reported differently. MySQL reports an error when there is an invalid constant character string, but does not report an error for an invalid column character string. GaussDB reports an error in either situation.
- The results returned by the comparison operator are different. For MySQL, **1** or **0** is returned. For GaussDB, **t** or **f** is returned.

Table 3-19 Operators

No.	MySQL	GaussDB	Difference
1	<>	Supported, with differences.	MySQL supports indexes, but GaussDB does not.
2	<=>	Supported, with differences.	MySQL supports indexes, but GaussDB does not support indexes, hash joins, or merge joins.

No.	MySQL	GaussDB	Difference

3	Row expressions	Supported, with differences.	• MySQL supports row comparison using the <=> operator, but GaussDB does not support row comparison using the <=> operator.
			• MySQL does not support comparison between row expressions and NULL values. In GaussDB, the <, <=, =, >=, >, and <> operators can be used to compare row expressions with NULL values.
			• IS NULL or ISNULL operations on row expressions are not supported in MySQL, but they are supported in GaussDB.
			• For operations by using operators that cannot be performed on row expressions, the error information in GaussDB is inconsistent with that in MySQL.
			GaussDB:
			m_db=# SELECT (1,2) <=> row(2,3);
			ERROR: could not determine interpretation of row comparison operator <=>
			LINE 1: select (1,2) <=> row(2,3);
			^
			HINT: unsupported operator.
			m_db=# SELECT (1,2) < NULL;
			?column?
			---------- 	
			
			(1 row)
			m_db=# SELECT (1,2) <> NULL;
			?column?
			---------- 	
			(1 row)
			m_db=# SELECT (1, 2) IS NULL;
			?column?
			---------- 	
			f
			(1 row)
			m_db=# SELECT ISNULL((1, 2));

No.	MySQL	GaussDB	Difference

			?column?
			---------- 	
			f
			(1 row)
			m_db=# SELECT ROW(0,0) BETWEEN ROW(1,1) AND ROW(2,2);
			ERROR: un support type
			MySQL:
			mysql> SELECT (1,2) <=> row(2,3);
			+--------------------+
			| (1,2) <=> row(2,3) |
			+--------------------+
			| 0 |
			+--------------------+
			1 row in set (0.00 sec)
			
			mysql> SELECT (1,2) < NULL;
			ERROR 1241 (21000): Operand should contain 2 column(s)
			mysql> SELECT (1,2) <> NULL;
			ERROR 1241 (21000): Operand should contain 2 column(s)
			mysql> SELECT (1, 2) IS NULL;
			ERROR 1241 (21000): Operand should contain 1 column(s)
			mysql> SELECT ISNULL((1, 2));
			ERROR 1241 (21000): Operand should contain 1 column(s)
			mysql> SELECT NULL BETWEEN NULL AND ROW(2,2);
			ERROR 1241 (21000): Operand should contain 1 column(s)

4	--	Supported.	MySQL indicates that an operand is negated twice and the result is equal to the original operand. GaussDB indicates a comment.

No.	MySQL	GaussDB	Difference
5	!!	Supported, with differences.	MySQL: The meaning of !! is the same as that of !, indicating NOT. GaussDB: ! indicates NOT. If there is a space between two exclamation marks (! !), it indicates NOT for twice. If there is no space between them (!!), it indicates factorial. **NOTE** • In GaussDB, when both factorial (!!) and NOT (!) are used, a space must be added between them. Otherwise, an error is reported. • In GaussDB, when multiple NOT operations are required, use a space between exclamation marks (! !).

No.	MySQL	GaussDB	Difference
6	[NOT] REGEXP	Supported, with differences.	• GaussDB and MySQL support different metacharacters in regular expressions. For example, GaussDB allows \d to indicate digits, \w to indicate letters, digits, and underscores (_), and \s to indicate spaces. However, MySQL does not support these metacharacters and considers them as normal character strings. • In GaussDB, '\b' can match '\\b', but in MySQL, the matching will fail. • In the new GaussDB framework, a backslash (\) indicates an escape character. In MySQL, two backslashes (\\) are used. • MySQL does not support two operators to be used together. • GaussDB reports an error when the input parameter of the pattern string **pat** is invalid and only the right single parenthesis ')' exists. MySQL has a bug, which has been fixed in later versions. • When **de|abc** matches **de** or **abc**, if there is a null value on the left or right of |, MySQL reports an error. This bug has been fixed in later versions. • The regular expression of the blank character

No.	MySQL	GaussDB	Difference
			[\t] can match the character class [:blank:] in GaussDB, but MySQL's [\t] cannot match [:blank:]. MySQL has a bug, which has been fixed in later versions. • GaussDB supports non-greedy pattern matching. That is, the number of matching characters is as small as possible. A question mark (?) is added after some special characters, for example, ??, *?, +?, {n}?, {n,}?, and {n,m}?. MySQL 5.7 does not support non-greedy pattern matching, and the error message "Got error 'repetition-operator operand invalid' from regexp" is displayed. MySQL 8.0 already supports this function. • In the binary character set, the text and BLOB types are converted to the bytea type. The REGEXP operator does not support the bytea type. Therefore, the two types cannot be matched.

No.	MySQL	GaussDB	Difference
7	LIKE	Supported, with differences.	MySQL: The left operand of LIKE can only be an expression of a bitwise or arithmetic operation, or expression consisting of parentheses. The right operand of LIKE can only be an expression consisting of unary operators (excluding NOT) or parentheses. GaussDB: The left and right operands of LIKE can be any expression.
8	[NOT] BETWEEN AND	Supported, with differences.	MySQL: [NOT] BETWEEN AND is nested from right to left. The first and second operands of [NOT] BETWEEN AND can only be expressions of bitwise or arithmetic operations, or expressions consisting of parentheses. GaussDB: [NOT] BETWEEN AND is nested from left to right. The first and second operands of [NOT] BETWEEN AND can be any expression.
9	IN	Supported, with differences.	MySQL: The left operand of IN can only be an expression of a bitwise or arithmetic operation, or expression consisting of parentheses. GaussDB: The left operand of IN can be any expression.
10	!	Supported, with differences.	MySQL: The operand of ! can only be an expression consisting of unary operators (excluding NOT) or parentheses. GaussDB: The operand of ! can be any expression.

No.	MySQL	GaussDB	Difference
11	#	Not supported.	MySQL supports the comment tag (#), but GaussDB does not.
12	BINARY	Supported, with differences.	Expressions (including some functions and operators) supported by GaussDB are different from those supported by MySQL. For GaussDB-specific expressions such as '~' and 'IS DISTINCT FROM', due to the higher priority of the BINARY keyword, when BINARY expr is used, BINARY is combined with the left parameters of '~' and 'IS DISTINCT FROM' first. As a result, an error is reported.
13	Negation (-)	Supported, with differences.	If the number of consecutive negation times exceeds 1, the result type is different from that in MySQL.

No.	MySQL	GaussDB	Difference

14	XOR, |, & , < , > , <=, >=, =, and !=	Supported, but the execution mechanism is different.	The execution mechanism of MySQL is as follows: After the left operand is executed, the system checks whether the result is empty and then determines whether to execute the right operand.
			As for the execution mechanism of GaussDB, after the left and right operands are executed, the system checks whether the result is empty.
			If the result of the left operand is empty and an error is reported during the execution of the right operand, MySQL does not report an error but directly returns an error. GaussDB reports an error during the execution.
			Behavior in MySQL:
			`mysql> SELECT version();`
			`+------------------+`
			`| version() |`
			`+------------------+`
			`| 5.7.44-debug-log |`
			`+------------------+`
			`1 row in set (0.00 sec)`
			
			`mysql> dROP TABLE IF EXISTS data_type_table;`
			`Query OK, 0 rows affected (0.02 sec)`
			
			`mysql> CREATE TABLE data_type_table (`
			`-> MyBool BOOL,`
			`-> MyBinary BINARY(10),`
			`-> MyYear YEAR`
			`-> );`
			`Query OK, 0 rows affected (0.02 sec)`
			
			`mysql> INSERT INTO data_type_table VALUES (TRUE, 0x1234567890, '2021');`
			`Query OK, 1 row affected (0.00 sec)`
			
			`mysql> SELECT (MyBool % MyBinary) | (MyBool - MyYear) FROM data_type_table;`

No.	MySQL	GaussDB	Difference

			+----------
			---+
			| (MyBool % MyBinary) | (MyBool - MyYear) |
			+----------
			---+
			| NULL |
			+----------
			---+
			1 row in set, 2 warnings (0.00 sec)
			Behavior in GaussDB:
			m_db=# DROP TABLE IF EXISTS data_type_table;
			DROP TABLE
			m_db=# CREATE TABLE data_type_table (
			m_db(# MyBool BOOL,
			m_db(# MyBinary BINARY(10),
			m_db(# MyYear YEAR
			m_db(#);
			CREATE TABLE
			m_db=# INSERT INTO data_type_table VALUES (TRUE, 0x1234567890, '2021');
			INSERT 0 1
			m_db=# SELECT (MyBool % MyBinary) | (MyBool - MyYear) FROM data_type_table;
			WARNING: Truncated incorrect double value: '4Vx '
			CONTEXT: referenced column: (MyBool % MyBinary) | (MyBool - MyYear)
			WARNING: division by zero
			CONTEXT: referenced column: (MyBool % MyBinary) | (MyBool - MyYear)
			ERROR: Bigint is out of range.
			CONTEXT: referenced column: (MyBool % MyBinary) | (MyBool - MyYear)

Table 3-20 Differences in operator combinations

Example of Operator Combination	MySQL	GaussDB	Description
SELECT 1 LIKE 3 & 1;	Not supported	Supported.	The right operand of LIKE cannot be an expression consisting of bitwise operators.
SELECT 1 LIKE 1 +1;	Not supported	Supported.	The right operand of LIKE cannot be an expression consisting of arithmetic operators.

Example of Operator Combination	MySQL	GaussDB	Description
SELECT 1 LIKE NOT 0;	Not supported	Supported.	The right operand of LIKE can only be an expression consisting of unary operators (such as +, -, or ! but except NOT) or parentheses.
SELECT 1 BETWEEN 1 AND 2 BETWEEN 2 AND 3;	Right-to-left combination	Left-to-right combination	It is recommended that parentheses be added to specify the priority.
SELECT 2 BETWEEN 1=1 AND 3;	Not supported	Supported.	The second operand of BETWEEN cannot be an expression consisting of comparison operators.
SELECT 0 LIKE 0 BETWEEN 1 AND 2;	Not supported	Supported.	The first operand of BETWEEN cannot be an expression consisting of pattern matching operators.
SELECT 1 IN (1) BETWEEN 0 AND 3;	Not supported	Supported.	The first operand of BETWEEN cannot be an expression consisting of IN operators.
SELECT 1 IN (1) IN (1);	Not supported	Supported.	The second left operand of the IN expression cannot be an expression consisting of INs.
SELECT ! NOT 1;	Not supported	Supported.	The operand of ! can only be an expression consisting of unary operators (such as +, -, or ! but except NOT) or parentheses.

NOTE

Combinations of operators that are supported in GaussDB but not supported in MySQL are not recommended. You are advised to combine operators according to the rules in MySQL.

Index Differences

- Currently, GaussDB supports only UB-tree and B-tree indexes.
- For fuzzy match (LIKE operator), the default index created can be used in MySQL, but cannot be used in GaussDB. You need to use the following syntax to specify **opclass** to, for example, **text_pattern_ops**, so that LIKE operators can be used as indexes:
  ```
  CREATE INDEX indexname ON tablename(col [opclass]);
  ```
- In the B-tree/UB-tree index scenario, the original logic of the native GaussDB is retained. That is, index scan supports comparison of types in the same operator family, but does not support other index types currently.

- In the operation scenarios involving index column type and constant type, the conditions that indexes of a WHERE clause are supported in GaussDB is different from those in MySQL, as shown in the following table. For example, GaussDB does not support indexes in the following statement:

```
create table t(_int int);
create index idx on t(_int) using BTREE;
select * from t where _int >  2.0;
```

  NOTE

  In the operation scenarios involving index column type and constant type in the WHERE clause, you can use the cast function to convert the constant type to the column type for indexing.

```
select * from t where _int > cast(2.0 as signed);
```

Table 3-21 Differences in index support

Index Column Type	Constant Type	GaussDB	MySQL
Integer	Integer	Yes	Yes
Floating-point	Floating-point	Yes	Yes
Fixed-point	Fixed-point	Yes	Yes
String	String	Yes	Yes
Binary	Binary	Yes	Yes
Time with date	Time with date	Yes	Yes
TIME	TIME	Yes	Yes
Time with date	Type that can be converted to time type with date (for example, integers such as 20231130)	Yes	Yes
Time with date	TIME	Yes	Yes
TIME	Constants that can be converted to the TIME type (for example, integers such as 203008)	Yes	Yes
Floating-point	Integer	Yes	Yes
Floating-point	Fixed-point	Yes	Yes
Floating-point	String	Yes	Yes
Floating-point	Binary	Yes	Yes

Index Column Type	Constant Type	GaussDB	MySQL
Floating-point	Time with date	Yes	Yes
Floating-point	TIME	Yes	Yes
Fixed-point	Integer	Yes	Yes
String	Time with date	Yes	No
String	TIME	Yes	No
Binary	String	Yes	Yes
Binary	Time with date	Yes	No
Binary	TIME	Yes	No
Integer	Floating-point	No	Yes
Integer	Fixed-point	No	Yes
Integer	String	No	Yes
Integer	Binary	No	Yes
Integer	Time with date	No	Yes
Integer	TIME	No	Yes
Fixed-point	Floating-point	No	Yes
Fixed-point	String	No	Yes
Fixed-point	Binary	No	Yes
Fixed-point	Time with date	No	Yes
Fixed-point	TIME	No	Yes
String	Binary	No	Yes
Time with date	Integer (that cannot be converted to the time type with date)	No	Yes
Time with date	Floating-point (that cannot be converted to the time type with date)	No	Yes

Index Column Type	Constant Type	GaussDB	MySQL
Time with date	Fixed-point (that cannot be converted to the time type with date)	No	Yes
TIME	Integer (that cannot be converted to the TIME type)	No	Yes
TIME	Character string (that cannot be converted to the TIME type)	No	Yes
TIME	Binary (that cannot be converted to the TIME type)	No	Yes
TIME	Time with date	No	Yes

Table 3-22 Whether index use is supported

Index Column Type	Constant Type	Use Index or Not	MySQL
String	Integer	No	No
String	Floating-point	No	No
String	Fixed-point	No	No
Binary	Integer	No	No
Binary	Floating-point	No	No
Binary	Fixed-point	No	No
Time with date	Character string (that cannot be converted to the time type with date)	No	No
Time with date	Binary (that cannot be converted to the time type with date)	No	No

Index Column Type	Constant Type	Use Index or Not	MySQL
TIME	Floating-point (that cannot be converted to the TIME type)	No	No
TIME	Fixed-point (that cannot be converted to the TIME type)	No	No

3.5 Character Sets

GaussDB allows you to specify the following character sets for databases, schemas, tables, or columns.

Table 3-23 Character sets

No.	MySQL	GaussDB
1	utf8mb4	Supported.
2	utf8	Supported.
3	gbk	Supported.
4	gb18030	Supported.
5	binary	Supported.

NOTE

- **utf8** and **utf8mb4** refer to the same character set in GaussDB. The maximum code length is 4 bytes. If the current character set is **utf8** and the collation is set to **utf8mb4_bin**, **utf8mb4_general_ci**, **utf8mb4_unicode_ci**, or **utf8mb4_0900_ai_ci** (for example, by running **select _utf8'a' collate utf8mb4_bin**), MySQL reports an error but GaussDB does not report an error. The difference also exists when the character set is **utf8mb4** and the collation is set to **utf8_bin**, **utf8_general_ci**, or **utf8_unicode_ci**.
- The lexical syntax is parsed based on byte streams. If a multi-byte character contains code that is consistent with symbols such as '\', '\'', and '\\', the behavior of the multi-byte character is inconsistent with that in MySQL. In this case, you are advised to disable the escape character function temporarily.

3.6 Collation Rules

GaussDB allows you to specify the following collation rules for schemas, tables, or columns.

NOTE

Differences in collation rules:

- Currently, only the character string type and some binary types support the specified collation rules. You can check whether the typcollation attribute of a type in the pg_type system catalog is not 0 to determine whether the type supports the collation. The collation can be specified for all types in MySQL. However, collation rules are meaningless except those for character strings and binary types.
- The current collation rules (except binary) can be specified only when the corresponding character set is the same as the database-level character set. In GaussDB, the character set must be the same as the database character set, and multiple character sets cannot be used together in a table.
- The default collation of the utf8mb4 character set is utf8mb4_general_ci, which is the same as that in MySQL 5.7.

Table 3-24 Collation rules

No.	MySQL	GaussDB
1	utf8mb4_general_ci	Supported.
2	utf8mb4_unicode_ci	Supported.
3	utf8mb4_bin	Supported.
4	gbk_chinese_ci	Supported.
5	gbk_bin	Supported.
6	gb18030_chinese_ci	Supported.
7	gb18030_bin	Supported.
8	binary	Supported.
9	utf8mb4_0900_ai_ci	Supported.
10	utf8_general_ci	Supported.
11	utf8_bin	Supported.
12	utf8_unicode_ci	Supported.

3.7 Transactions

GaussDB is compatible with MySQL transactions, but there are some differences. This section describes transaction-related differences in GaussDB M-compatible databases.

Default Transaction Isolation Levels

The default isolation level of an M-compatible database is READ COMMITTED, and that of MySQL is REPEATABLE-READ.

```
-- View the current transaction isolation level.
m_db=# SHOW transaction_isolation;
```


Sub-transactions

In an M-compatible database, SAVEPOINT is used to create a savepoint (sub-transaction) in the current transaction, and ROLLBACK TO SAVEPOINT is used to roll back to a savepoint (sub-transaction). After the sub-transaction is rolled back, the parent transaction can continue to run, the rollback of a sub-transaction does not affect the transaction status of the parent transaction.

No savepoint (sub-transaction) can be created in MySQL.

Nested Transactions

A nested transaction refers to a new transaction started in a transaction block.

In an M-compatible database, if a new transaction is started in a normal transaction block, a warning is displayed indicating that an ongoing transaction exists and the start command is ignored. If a new transaction is started in an abnormal transaction block, an error is reported. The transaction can be executed only after **ROLLBACK/COMMIT** is executed. If **ROLLBACK/COMMIT** is executed, the previous statement is rolled back.

In MySQL, if a new transaction is started in a normal transaction block, the previous transaction is committed and then the new transaction is started. If a new transaction is started in an abnormal transaction block, the error is ignored, and the previous error-free statement is committed and the new transaction is started.

```
-- In an M-compatible database, if a new transaction is started in a normal transaction block, a warning is generated and the transaction is ignored.
m_db=# DROP TABLE IF EXISTS test_t;
m_db=# CREATE TABLE test_t(a int, b int);
m_db=# BEGIN;
m_db=# INSERT INTO test_t values(1, 2);
m_db=# BEGIN; -- The warning "There is already a transaction in progress" is displayed.
m_db=# SELECT * FROM test_t ORDER BY 1;
m_db=# COMMIT;

-- In an M-compatible database, if a new transaction is started in an abnormal transaction block, an error is reported. The transaction can be executed only after ROLLBACK/COMMIT is executed.
m_db=# BEGIN;
m_db=# ERROR sql; -- Error statement.
m_db=# BEGIN; -- An error is reported.
m_db=# COMMIT; -- It can be executed only after ROLLBACK/COMMIT is executed.
```

Statements Committed Implicitly

An M-compatible database uses GaussDB for storage and inherits the GaussDB transaction mechanism. If a DDL or DCL statement is executed in a transaction, the transaction is not automatically committed.

In MySQL, if DDL, DCL, management-related, or lock-related statements are executed, the transaction is automatically committed.

```
-- In M-compatible database, table creation and GUC parameter setting support rollback.
m_db=# DROP TABLE IF EXISTS test_table_rollback;
m_db=# BEGIN;
m_db=# CREATE TABLE test_table_rollback(a int, b int);
m_db=# \d test_table_rollback;
m_db=# ROLLBACK;
m_db=# \d test_table_rollback; -- This table does not exist.
```


Differences in SET TRANSACTION

In an M-compatible database, if SET TRANSACTION is used to set the isolation level or transaction access mode for multiple times, only the last setting takes effect. Transaction features can be separated by spaces or commas (,).

In MySQL, SET TRANSACTION cannot be used to set the isolation level or transaction access mode for multiple times. Transaction features can only be separated by commas (,).

Table 3-25 Differences in SET TRANSACTION

No.	Syntax	Function	Difference
1	SET TRANSACTION	Sets transactions.	In an M-compatible database, SET TRANSACTION takes effect in session-level transactions. In MySQL, SET TRANSACTION takes effect in the next transaction.
2	SET SESSION TRANSACTION	Sets session-level transactions.	-
3	SET GLOBAL TRANSACTION	Sets global session-level transactions. This feature is applicable to subsequent sessions and has no impact on the current session.	In an M-compatible database, GLOBAL takes effect in global session-level transactions and is applicable only to the current database instance. In MySQL, this feature takes effect in all databases.

```
-- SET TRANSACTION takes effect in session-level transactions.
m_db=# SET TRANSACTION ISOLATION LEVEL READ COMMITTED READ WRITE;
m_db=# SHOW transaction_isolation;
m_db=# SHOW transaction_read_only;
-- In an M-compatible database, if the isolation level or transaction access mode is set for multiple times, only the last setting takes effect.
m_db=# SET SESSION TRANSACTION ISOLATION LEVEL READ COMMITTED, ISOLATION LEVEL REPEATABLE READ, READ WRITE, READ ONLY;
m_db=# SHOW transaction_isolation; -- repeatable read
m_db=# SHOW transaction_read_only; -- on
```

Differences in START TRANSACTION

In an M-compatible database, when START TRANSACTION is used to start a transaction, the isolation level can be set. If the isolation level or transaction access mode is set for multiple times, only the last setting takes effect. In the current version, consistency snapshot cannot be enabled immediately. Transaction features can be separated by spaces or commas (,).

In MySQL, if START TRANSACTION is used to start a transaction, the isolation level cannot be set and the transaction access mode cannot be set for multiple times. Transaction features can only be separated by commas (,).


```
-- Start a transaction and set the isolation level.
m_db=# START TRANSACTION ISOLATION LEVEL READ COMMITTED;
m_db=# COMMIT;
-- Set the access mode for multiple times.
m_db=# START TRANSACTION READ ONLY, READ WRITE;
m_db=# COMMIT;
```

Transaction-related GUC Parameters

Table 3-26 Differences in transaction-related GUC parameters

No.	GUC Parameter	Function	Difference
1	autocommit	Sets the automatic transaction commit mode.	-

No.	GUC Parameter	Function	Difference
2	transaction_isolation	Sets the isolation level of the current transaction in an M-compatible database. Sets the isolation level of a session-level transaction in MySQL.	• In GaussDB, you can only change the isolation level of the current transaction by running the **SET** command. To change the session-level isolation level, use **default_transaction_isolation**. In MySQL, you can run the **SET** command to change the transaction isolation level for a session. • The supported range is different. MySQL supports the following isolation levels, which are case-insensitive but space-sensitive: – READ-COMMITTED – READ-UNCOMMITTED – REPEATABLE-READ – SERIALIZABLE GaussDB supports the following isolation levels, which are case-sensitive and space-sensitive: – read committed – read uncommitted – repeatable read – serializable – default (The level is set to be the same as the default isolation level in the session.) – If **m_format_dev_version** is set to **'s2'**, the isolation levels of MySQL can be set. • In GaussDB, the value of **transaction_isolation** of a new transaction is initialized to the value of **default_transaction_isolation**.
3	tx_isolation	Sets the transaction isolation level. **tx_isolation** and **transaction_isolation** are synonyms.	This parameter can be queried but cannot be modified in an M-compatible database.

No.	GUC Parameter	Function	Difference
4	default_transaction_isolation	Sets the transaction isolation level.	In an M-compatible database, the **SET** command is used to change the transaction isolation level for a session. MySQL does not support this system parameter.
5	transaction_read_only	Sets the access mode of a transaction.	1. In an M-compatible database, only the access mode of the current transaction can be changed by using the **SET** command. If you want to change the access mode of a session-level transaction, you can use **default_transaction_read_only**. In MySQL, you can run the **SET** command to change the transaction isolation level for a session. 2. In GaussDB, the value of **transaction_read_only** of a new transaction is initialized to the value of **default_transaction_read_only**.
6	tx_read_only	Sets the access mode of a transaction. **tx_read_only** and **transaction_read_only** are synonyms.	This parameter can be queried but cannot be modified in an M-compatible database.
7	default_transaction_read_only	Sets the access mode of a transaction.	In an M-compatible database, the **SET** command is used to change the access mode of a session-level transaction. MySQL does not support this system parameter.

3.8 SQL

GaussDB is compatible with most MySQL syntax, but there are some differences. This section describes the MySQL syntax supported by GaussDB.

- Some keywords can be used as identifiers in MySQL, but cannot or are restricted to be identifiers in M-compatible mode, as listed in **Table 3-27**.

Table 3-27 Keywords restricted to be identifiers

Keyword Type	Keyword	Constraint
Reserved (Type or function is allowed.)	COLLATION and COMPACT	They cannot be used as identifiers in other databases except for functions and variables.
Non-reserved (Type or function is not allowed.)	BIT, BOOLEAN, COALESCE, DATE, NATIONAL, NCHAR, NONE, NUMBER, TEXT, TIME, TIMESTAMP, and TIMESTAMPDIFF	They cannot be used as identifiers for functions or variables.
Reserved	ANY, ARRAY, BUCKETS, DO, END, LESS, MODIFY, OFFSET, ONLY, RETURNING, SOME, and USER	They cannot be used as identifiers in any database.

- The GaussDB optimizer is different from the MySQL optimizer. Due to the difference in the execution plans generated by optimizers, the GaussDB behavior may be inconsistent with the MySQL behavior, but it does not affect the service data result.

  For example, in the following scenario, when GaussDB calculates **col1** and uses **col1** for WHERE comparison, the cast function is called and two WARNING records are generated.

  MySQL calls the cast function when calculating col1. During WHERE comparison, the calculated value is used for comparison. As a result, a WARNING record is generated.

```
-- Behavior in GaussDB:
m_db=# select * from (select cast('abc' as decimal) as col1) t1 where col1=0;
WARNING:  Truncated incorrect DECIMAL value: 'abc'
WARNING:  Truncated incorrect DECIMAL value: 'abc'
CONTEXT:  referenced column: col1
 col1
------
    0
(1 row)

m_db=# explain verbose select * from (select cast('abc' as decimal) as col1) t1 where col1=0;
WARNING:  Truncated incorrect DECIMAL value: 'abc'
WARNING:  Truncated incorrect DECIMAL value: 'abc'
CONTEXT:  referenced column: col1
                QUERY PLAN
-------------------------------------------
 Result  (cost=0.00..0.01 rows=1 width=0)
   Output: 0::decimal
(2 rows)

-- Behavior in MySQL:
mysql>  select * from (select cast('abc' as decimal) as col1) t1 where col1=0;
+------+
| col1 |
+------+
|    0 |
+------+
```



```
1 row in set, 1 warning (0.00 sec)

mysql> show warnings;
+---------+------+-----------------------------------------+
| Level   | Code | Message                                 |
+---------+------+-----------------------------------------+
| Warning | 1292 | Truncated incorrect DECIMAL value: 'abc' |
+---------+------+-----------------------------------------+
1 row in set (0.00 sec)

mysql> explain select * from (select cast('abc' as decimal) as col1) t1 where col1=0;
+----+-------------+------------+------------+--------+---------------+------+---------+------+------+----------
+----------------+
| id | select_type | table      | partitions | type   | possible_keys | key  | key_len | ref  | rows | filtered |
Extra          |
+----+-------------+------------+------------+--------+---------------+------+---------+------+------+----------
+----------------+
|  1 | PRIMARY     | <derived2> | NULL       | system | NULL          | NULL | NULL    | NULL |    1 |
100.00 | NULL           |
|  2 | DERIVED     | NULL       | NULL       | NULL   | NULL          | NULL | NULL    | NULL | NULL |
NULL | No tables used |
+----+-------------+------------+------------+--------+---------------+------+---------+------+------+----------
+----------------+
2 rows in set, 2 warnings (0.01 sec)

mysql> show warnings;
+---------+------+-----------------------------------------------------------------------+
| Level   | Code | Message                                                               |
+---------+------+-----------------------------------------------------------------------+
| Warning | 1292 | Truncated incorrect DECIMAL value: 'abc'                              |
| Note    | 1003 | /* select#1 */ select '0' AS `col1` from dual where ('0' = 0) |
+---------+------+-----------------------------------------------------------------------+
2 rows in set (0.00 sec)
```

3.8.1 Keywords

The constraint differences are as follows:

- In M-compatible mode, keywords are reserved keywords. In MySQL, keywords are non-reserved keywords. In M-compatible mode, keywords cannot be used as table names, column names, column aliases, AS column aliases, AS table aliases, table aliases, function names, or variable names. In MySQL, keywords can be used as these names or aliases.
- In M-compatible mode, keywords are non-reserved keywords. In MySQL, keywords are reserved keywords. In M-compatible mode, keywords can be used as table names, column names, column aliases, AS column aliases, AS table aliases, table aliases, function names, or variable names. In MySQL, keywords cannot be used as these names or aliases.
- In M-compatible mode, keywords are reserved keywords (functions or types). In MySQL, keywords are reserved keywords. In M-compatible mode, keywords can be used as column aliases, AS column aliases, function names, or variable names. In MySQL, keywords cannot be used as these names or aliases.
- In M-compatible mode, keywords are reserved keywords (functions or types). In MySQL, keywords are non-reserved keywords. In M-compatible mode, keywords cannot be used as table aliases, column names, AS table aliases, or table aliases. In MySQL, keywords can be used as these names or aliases.
- In M-compatible mode, keywords are non-reserved keywords (cannot be functions or types). In MySQL, keywords are reserved keywords. In M-compatible mode, keywords can be used as table aliases, column names, column aliases, AS column aliases, AS table aliases, table aliases, or variable names. In MySQL, keywords cannot be used as these names or aliases.

- In M-compatible mode, keywords are non-reserved keywords (cannot be functions or types). In MySQL, keywords are non-reserved keywords. In M-compatible mode, keywords cannot be used as function names. In MySQL, keywords can be used as these names or aliases.

  NOTE

  Among non-reserved keywords, reserved keywords (functions or types), and non-reserved keywords (not functions or types) in M-compatible mode, the following keywords cannot be used as column aliases:

  BETWEEN, BIGINT, BLOB, CHAR, CHARACTER, CROSS, DEC, DECIMAL, DIV, DOUBLE, EXISTS, FLOAT, FLOAT4, FLOAT8, GROUPING, INNER, INOUT, INT, INT1, INT2, INT3, INT4, INT8, INTEGER, JOIN, LEFT, LIKE, LONGBLOB, LONGTEXT, MEDIUMBLOB, MEDIUMINT, MEDIUMTEXT, MOD, NATURAL, NUMERIC, OUT, OUTER, PRECISION, REAL, RIGHT, ROW, ROW_NUMBER, SIGNED, SMALLINT, SOUNDS, TINYBLOB, TINYINT, TINYTEXT, VALUES, VARCHAR, VARYING, and WITHOUT.

  SIGNED and WITHOUT can be used as column aliases in MySQL.

3.8.2 Identifiers

Differences in identifiers in M-compatible mode are as follows:

- In GaussDB, unquoted identifiers cannot start with a dollar sign ($). In MySQL unquoted identifiers can start with a dollar sign ($).
- GaussDB unquoted identifiers support case-sensitive database objects.
- GaussDB identifiers support extended characters from U+0080 to U+00FF. MySQL identifiers support extended characters from U+0080 to U+FFFF.
- As for unquoted identifier, a table that starts with a digit and ends with an e or E as the identifier cannot be created in GaussDB. For example:

```
-- GaussDB reports an error indicating that this operation is not supported. MySQL supports this operation.
m_db=# CREATE TABLE 23e(c1 int);
ERROR:  syntax error at or near "23"
LINE 1: CREATE TABLE 23e(c1 int);
                     ^
m_db=# CREATE TABLE t1(23E int);
ERROR:  syntax error at or near "23"
LINE 1: CREATE TABLE t1(23E int);
                        ^
```

- As for quoted identifiers, tables whose column names contain only digits or scientific computing cannot be directly used in GaussDB. You need to use them in quotes. This rule also applies to the dot operator (.) scenarios. For example:

```
-- Create a table whose column names contain only numbers or scientific computing.
m_db=# CREATE TABLE t1(`123` int, `1e3` int, `1e` int);
CREATE TABLE

-- Insert data into the table.
m_db=# INSERT INTO t1 VALUES(7, 8, 9);
INSERT 0 1

-- The result is not as expected, but is the same as that in MySQL.
m_db=# SELECT 123 FROM t1;
 ?column?
----------
      123
(1 row)

-- The result is not as expected, but is the same as that in MySQL.
m_db=# SELECT 1e3 FROM t1;
```



```
 ?column?
----------
    1000
(1 row)

-- The result is not as expected and is not the same as that in MySQL.
m_db=# SELECT 1e FROM t1;
 e
---
 1
(1 row)

-- The correct way to use is as follows:
m_db=# SELECT `123` FROM t1;
 123
-----
   7
(1 row)

m_db=# SELECT `1e3` FROM t1;
 1e3
-----
   8
(1 row)

m_db=# SELECT `1e` FROM t1;
 1e
----
  9
(1 row)

-- Dot operator scenarios are not supported by GaussDB but supported by MySQL.
m_db=# SELECT t1.123 FROM t1;
ERROR:  syntax error at or near ".123"
LINE 1: SELECT t1.123 FROM t1;
                 ^
m_db=# SELECT t1.1e3 FROM t1;
ERROR:  syntax error at or near "1e3"
LINE 1: SELECT t1.1e3 FROM t1;
                  ^
m_db=# SELECT t1.1e FROM t1;
ERROR:  syntax error at or near "1"
LINE 1: SELECT t1.1e FROM t1;
                  ^
-- The correct way to use in dot operator scenarios is as follows:
m_db=# SELECT t1.`123` FROM t1;
 123
-----
   7
(1 row)

m_db=# SELECT t1.`1e3` FROM t1;
 1e3
-----
   8
(1 row)

m_db=# SELECT t1.`1e` FROM t1;
 1e
----
  9
(1 row)

m_db=# DROP TABLE t1;
DROP TABLE
```

- In GaussDB, the partition name is case-sensitive when it is enclosed in double quotation marks (**SQL_MODE** must be set to **ANSI_QUOTES**) or backquotes, but in MySQL the partition name is case-insensitive.

3.8.3 DDL

Table 3-28 DDL syntax compatibility

Description	Syntax	Difference
Create primary keys, UNIQUE indexes, and foreign keys during table creation and modification.	ALTER TABLE and CREATE TABLE	• GaussDB: When the table joined with the constraint is Ustore and USING BTREE is specified in the SQL statement, the underlying index is created as UB-tree. • GaussDB: Foreign keys can be used as partition keys. • The index name, constraint name, and key name are unique in a schema in GaussDB and unique in a table in MySQL.

Description	Syntax	Difference
Support auto-increment columns.	ALTER TABLE and CREATE TABLE	• It is recommended that an auto-increment column in GaussDB be the first column of an index. Otherwise, an alarm is generated during table creation. The auto-increment column in MySQL must be the first column of the index. Otherwise, an error is reported during table creation. In GaussDB, an error occurs when some operations (such as ALTER TABLE EXCHANGE PARTITION) are performed on a table that contains auto-increment columns. • In GaussDB, for **AUTO_INCREMENT = value**, **value** must be a positive number less than 2^127 in GaussDB. In MySQL, **value** can be **0**. • In GaussDB, an error occurs if the auto-increment continues after an auto-increment value reaches the maximum value of a column data type. In MySQL, errors or warnings may be generated during auto-increment, and sometimes auto-increment continues until the maximum value is reached. • GaussDB does not support the *innodb_autoinc_lock_mode* system variable, but when its GUC parameter **auto_increment_cache** is set to **0**, the behavior of inserting auto-increment columns in batches is similar to that when the

Description	Syntax	Difference
		MySQL system variable *innodb_autoinc_lock_mode* is set to **1**. ● In GaussDB, when 0s, NULLs, and definite values are imported or batch inserted into auto-increment columns, the auto-increment values inserted after an error occurs in GaussDB may not be the same as those in MySQL. – The **auto_increment_cache** parameter is provided to control the number of reserved auto-increment values. ● In GaussDB, when auto-increment is triggered by parallel import or insertion of auto-increment columns, the cache value reserved for each parallel thread is used only in the thread. If the cache value is not used up, the values of auto-increment columns in the table are discontinuous. The auto-increment value generated by parallel insertion cannot be guaranteed to be the same as that generated in MySQL. ● In GaussDB, when auto-increment columns are batch inserted into a local temporary table, no auto-increment value is reserved. In normal scenarios, auto-increment values are not discontinuous. In MySQL, the auto-increment result of an auto-increment column in a temporary

Description	Syntax	Difference
		table is the same as that in an ordinary table. • The SERIAL data type of GaussDB is an original auto-increment column, which is different from the **AUTO_INCREMENT** column. The SERIAL data type of MySQL is the **AUTO_INCREMENT** column. • GaussDB does not allow the value of **auto_increment_offset** to be greater than that of **auto_increment_increment**. Otherwise, an error occurs. MySQL allows it and states that **auto_increment_offset** will be ignored. • If a table has a primary key or index, the sequence in which the **ALTER TABLE** command rewrites table data may be different from that in MySQL. GaussDB rewrites table data based on the table data storage sequence, while MySQL rewrites table data based on the primary key or index sequence. As a result, the auto-increment sequence may be different. • When the **ALTER TABLE** command in GaussDB is used to add or modify auto-increment columns, the number of auto-increment values reserved for the first time is the number of rows in the table statistics. The number of rows in the statistics may not be the same as that in MySQL.

Description	Syntax	Difference
		• The return value of the last_insert_id function in GaussDB is a 128-bit integer. • When GaussDB performs auto-increment in a trigger or user-defined function, the return value of last_insert_id is updated. MySQL does not update it. • If the values of the GUC parameters **auto_increment_offset** and **auto_increment_increment** in GaussDB are out of range, an error occurs. MySQL automatically changes the value to a boundary value.
Support prefix indexes.	CREATE INDEX, ALTER TABLE, and CREATE TABLE	• GaussDB: The prefix length cannot exceed 2676. The actual length of the key value is restricted by the internal page. If a column contains multi-byte characters or an index has multiple keys, an error may be reported when the index line length exceeds the threshold. • GaussDB: The primary key index does not support prefix keys. The prefix length cannot be specified when a primary key is created or added.

Description	Syntax	Difference
Specify character sets and collation rules.	ALTER SCHEMA, ALTER TABLE, CREATE SCHEMA, and CREATE TABLE	• When you specify a database-level character set, except binary character sets, the character set of a new database or schema cannot be different from that specified by **server_encoding** of the database. • When you specify a table-level or column-level character set and collation, MySQL allows you to specify a character set and collation that are different from the database-level character set and collation. In GaussDB, the table-level and column-level character sets and collations support only the binary character sets and collations or can be the same as the database-level character sets and collations.
Add columns before the first column of a table or after a specified column during table modification.	ALTER TABLE	-
Alter the column name/definition.	ALTER TABLE	Currently, the DROP INDEX, DROP KEY, or ORDER BY is not supported.

Description	Syntax	Difference
Create a partitioned table.	CREATE TABLE PARTITION	• MySQL supports expressions but does not support multiple partition keys in the following scenarios: – The LIST/RANGE partitioning policy is used and the COLUMNS keyword is not specified. – The hash partitioning policy is used. • MySQL does not support expressions and supports multiple partition keys in the following scenarios: – The LIST/RANGE partitioning policy is used and the COLUMNS keyword is specified. – The KEY partitioning policy is used. • In GaussDB, expressions cannot be used as partition keys, and partitions cannot be specified. • GaussDB supports multiple partition keys only when the LIST or RANGE partitioning policy is used. • In GaussDB partitioned tables, generated columns cannot be used as partition keys.
Specify table-level and column-level comments during table creation and modification.	CREATE TABLE and ALTER TABLE	-
Specify index-level comments during index creation.	CREATE INDEX	-

Description	Syntax	Difference
Exchange the partition data of an ordinary table and a partitioned table.	ALTER TABLE PARTITION	Differences in ALTER TABLE EXCHANGE PARTITION: • For auto-increment columns, after the ALTER EXCHANGE PARTITION is executed in MySQL, the auto-increment columns are reset. In GaussDB, the auto-increment columns are not reset, and the auto-increment columns increase based on the old auto-increment value. • If MySQL tables or partitions use tablespaces, data in partitions and ordinary tables cannot be exchanged. If GaussDB tables or partitions use different tablespaces, data in partitions and ordinary tables can still be exchanged. • MySQL does not verify the default values of columns. Therefore, data in partitions and ordinary tables can be exchanged even if the default values are different. GaussDB verifies the default values. If the default values are different, data in partitions and ordinary tables cannot be exchanged. • After the DROP COLUMN operation is performed on a partitioned table or an ordinary table in MySQL, if the table structure is still consistent, data can be exchanged between partitions and ordinary tables. In GaussDB, data can be exchanged between partitions and ordinary tables only when the deleted columns of

Description	Syntax	Difference
		ordinary tables and partitioned tables are strictly aligned. • MySQL and GaussDB use different hash algorithms. Therefore, data stored in the same hash partition may be inconsistent. As a result, the exchanged data may also be inconsistent. • MySQL partitioned tables do not support foreign keys. If an ordinary table contains foreign keys or other tables reference foreign keys of an ordinary table, data in partitions and ordinary tables cannot be exchanged. GaussDB partitioned tables support foreign keys. If the foreign key constraints of two tables are the same, data in partitions and ordinary tables can be exchanged. If a GaussDB partitioned table does not contain foreign keys, an ordinary table is referenced by other tables, and the partitioned table is the same as the ordinary table, data in the partitioned table can be exchanged with that in the ordinary table.
Modify the partition key information of a partitioned table.	ALTER TABLE	MySQL allows you to modify the partition key information of a partitioned table, but GaussDB does not.

Description	Syntax	Difference
Support the CREATE TABLE ... LIKE syntax.	CREATE TABLE ... LIKE	• In versions earlier than MySQL 8.0.16, CHECK constraints are parsed but their functions are ignored. In this case, CHECK constraints are not replicated. GaussDB supports replication of CHECK constraints. • When a table is created, all primary key constraint names in MySQL are fixed to **PRIMARY KEY**. GaussDB does not support replication of primary key constraint names. • When a table is created, MySQL supports replication of unique key constraint names, but GaussDB does not. • When a table is created, MySQL versions earlier than 8.0.16 do not have CHECK constraint information, but GaussDB supports replication of CHECK constraint names. • When a table is created, MySQL supports replication of index names, but GaussDB does not. • When a table is created across sql_mode, MySQL is controlled by the loose mode and strict mode. The strict mode may become invalid in GaussDB. For example, if the source table has the default value **"0000-00-00"**, GaussDB can create a table that contains the default value **"0000-00-00"** in "no_zero_date" strict mode, which means that the strict mode is invalid.

Description	Syntax	Difference
		MySQL fails to create the table because it is controlled by the strict mode.
Create a partition.	ALTER TABLE [IF EXISTS] { table_name [*] | ONLY table_name | ONLY (table_name)} add_clause; add_clause: ADD {{partition_less_than_item | partition_start_end_item | partition_list_item} | PARTITION({partition_less_than_item | partition_start_end_item | partition_list_item})}	The syntax of the original partitioned table is retained. The following syntax cannot be used to add multiple partitions: ALTER TABLE table_name ADD PARTITION (partition_definition1, partition_definition1,…); Only the original syntax for adding multiple partitions is supported. ALTER TABLE table_name ADD PARTITION (partition_definition1), ADD PARTITION (partition_definition2[y1]), ...;
Truncate a partition.	ALTER TABLE [IF EXISTS] table_name truncate_clause;	For truncate_clause, the supported subitems are different: • M-compatible mode: TRUNCATE PARTITION { { ALL | partition_name [, ...] } | FOR (partition_value [, ...]) } [UPDATE GLOBAL INDEX] • MySQL: TRUNCATE PARTITION {partition_names | ALL}
Index name of a primary key	CREATE TABLE table_name (col_definitine ,PRIMARY KEY [index_name] [USING method] ({ column_name | (expression) }[ASC | DESC] } [, ...]) index_parameters [USING method| COMMENT 'string'])	The index name created after being specified by a primary key in GaussDB is the index name specified by a user. In MySQL, the index name is **PRIMARY**.
Delete dependent objects.	DROP drop_type name CASCADE;	In GaussDB, **CASCADE** needs to be added to delete dependent objects. In MySQL, **CASCADE** is not required.
The NOT NULL constraint does not allow NULL values to be inserted.	CREATE TABLE t1(id int NOT NULL DEFAULT 8); INSERT INTO t1 VALUES(NULL); INSERT INTO t1 VALUES(1),(NULL),(2);	In MySQL loose mode, NULL is converted and data is successfully inserted. In MySQL strict mode, NULL values cannot be inserted. GaussDB does not support this feature. NULL values cannot be inserted in loose or strict mode.

Description	Syntax	Difference
The CHECK constraint takes effect.	CREATE TABLE	The CREATE TABLE that contains the CHECK constraint takes effect in MySQL 8.0. MySQL 5.7 parses the syntax but the syntax does not take effect. GaussDB synchronizes this function of MySQL 8.0, and the GaussDB CHECK constraint can reference other columns, but MySQL cannot. A maximum of 32767 CHECK constraints can be added to a table in GaussDB.
The **algorithm** and **lock** options of an index do not take effect.	CREATE INDEX ... DROP INDEX ...	Currently, the index options **algorithm_option** and **lock_option** in the CREATE/DROP INDEX statement in M-compatible mode are supported only in syntax. No error is reported during creation, but they do not take effect.
The storage of hash partitions and level-2 partitions in CREATE TABLE in GaussDB is different from that in MySQL.	CREATE TABLE	In GaussDB, the hash functions used by hash partitioned tables and level-2 partitioned tables in the CREATE TABLE statement are different from those used in MySQL. Therefore, the storage of hash partitioned tables and level-2 partitioned tables is different from that in MySQL.

Description	Syntax	Difference
Partitioned table index	CREATE INDEX	GaussDB partitioned table indexes are classified into local and global indexes. A local index is bound to a specific partition, and a global index corresponds to the entire partitioned table. For details about how to create local and global indexes and the default rules, see "SQL Syntax > SQL Statement > C > CREATE INDEX " in *Developer Guide*. For example, if a unique index is created on a non-partition key, a global index is created by default. MySQL does not have global indexes. In GaussDB, if the partitioned table index is a global index, the global index is not updated by default when operations such as DROP, TRUNCATE, and EXCHANGE are performed on table partitions. As a result, the global index becomes invalid and cannot be selected in subsequent statements. To avoid this problem, you are advised to explicitly specify the UPDATE GLOBAL INDEX clause at the end of the partition syntax or set the global GUC parameter **enable_gpi_auto_update** to **true** (recommended) so that global indexes can be automatically updated during partition operations.

Description	Syntax	Difference
If the table is partitioned by key in the CREATE/ALTER TABLE statement, algorithms cannot be specified. Input parameters of some partition definition do not support expressions.	CREATE TABLE and ALTER TABLE	GaussDB: If the table is partitioned by key in the CREATE/ALTER TABLE statement, algorithms cannot be specified. The syntaxes that do not support expressions as input parameters are as follows: • PARTITION BY HASH() • PARTITION BY KEY() • VALUES LESS THAN()
Partitioned tables do not support LINEAR/KEY hash.	CREATE TABLE ... PARTITION ...	GaussDB: Partitioned tables do not support LINEAR/KEY hash.
The CHECK and AUTO_INCREMENT syntaxes cannot be used in the same column.	CREATE TABLE	The column using CHECK does not take effect in MySQL 5.7. When both CHECK and AUTO_INCREMENT are used on the same column, only AUTO_INCREMENT takes effect. However, GaussDB reports an error.
Delete dependent tables.	DROP TABLE	In GaussDB, CASCADE must be added to delete dependent tables. In MySQL, CASCADE is not required.

Description	Syntax	Difference
Options related to table definition.	CREATE TABLE ... and ALTER TABLE ...	• GaussDB does not support the following options: **AVG_ROW_LENGTH**, **CHECKSUM**, **COMPRESSION**, **CONNECTION**, **DATA DIRECTORY**, **INDEX DIRECTORY**, **DELAY_KEY_WRITE**, **ENCRYPTION**, **INSERT_METHOD**, **KEY_BLOCK_SIZE**, **MAX_ROWS**, **MIN_ROWS**, **PACK_KEYS**, **PASSWORD**, **STATS_AUTO_RECALC**, **STATS_PERSISTENT**, and **STATS_SAMPLE_PAGES**. • The following options do not report errors in GaussDB and do not take effect: **ENGINE** and **ROW_FORMAT**.
Encrypt the CMKs of CEKs in round robin (RR) mode and encrypt the plaintext of CEKs.	ALTER COLUMN ENCRYPTION KEY	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
The encrypted equality query feature adopts a multi-level encryption model. The master key encrypts the column key, and the column key encrypts data. This syntax is used to create a master key object.	CREATE CLIENT MASTER KEY	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Create a CEK that can be used to encrypt a specified column in a table.	CREATE COLUMN ENCRYPTION KEY	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.

Description	Syntax	Difference
Send keys to the server for caching. This function is used only when the memory decryption emergency channel is enabled. This is a fully-encrypted function.	\send_token	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Send keys to the server for caching. This function is used only when the memory decryption emergency channel is enabled. This is a fully-encrypted function.	\st	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Destroy the keys cached on the server. This function is used only when the memory decryption emergency channel is enabled. This is a fully-encrypted function.	\clear_token	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Destroy the keys cached on the server. This function is used only when the memory decryption emergency channel is enabled. This is a fully-encrypted function.	\ct	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Set the parameters for accessing the external key manager in the fully-encrypted database features.	\key_info KEY_INFO	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
Enable third-party dynamic libraries and set related parameters. This is a fully-encrypted function.	\crypto_module_info MODULE_INFO	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.

Description	Syntax	Difference
Enable third-party dynamic libraries and set related parameters. This is a fully-encrypted function.	\cmi MODULE_INFO	The M-compatible mode does not support the full encryption. Therefore, this syntax is not supported.
The GENERATED ALWAYS AS statement cannot reference columns generated by GENERATED ALWAYS AS.	Generated Always AS	In GaussDB, the GENERATED ALWAYS AS statement cannot reference columns generated by GENERATED ALWAYS AS, but it can in MySQL.
Support syntaxes that change table names.	ALTER TABLE tbl_name RENAME [TO | AS | =] new_tbl_name;	The ALTER RENAME syntax in GaussDB supports only the function of changing the table name and cannot be coupled with other function operations. In GaussDB, only the old table name column supports the usage of schema.table_name, and the new and old table names belong to the same schema. GaussDB does not support renaming of old and new tables across schemas. However, if you have the permission, you can modify the names of tables in other schemas in the current schema.
Disable the GUC parameter **enable_expr_fusion**.	SET enable_expr_fusion= ON	In M-compatible mode, the GUC parameter **enable_expr_fusion** cannot be enabled.

Description	Syntax	Difference
Support the CREATE VIEW AS SELECT syntax.	CREATE VIEW table_name AS query;	• For the following types, the query using the CREATE VIEW view_name AS query syntax cannot contain calculation operations (such as function call and calculation using operators): – BINARY[(n)] – BOOLEAN/BOOL – VARBINARY(n) – CHAR[(n)] – VARCHAR(n) – TIME[(p)] – DATETIME[(p)] – TIMESTAMP[(p)] – BIT[(n)] – NUMERIC[(p[,s])] – DECIMAL[(p[,s])] – DEC[(p[,s])] – FIXED[(p[,s])] – FLOAT4[(p, s)] – FLOAT8[(p,s)] – FLOAT[(p)] – REAL[(p, s)] – FLOAT[(p, s)] – DOUBLE[(p,s)] – DOUBLE PRECISION[(p,s)] – TEXT – TINYTEXT – MEDIUMTEXT – LONGTEXT – BLOB – TINYBLOB – MEDIUMBLOB – LONGBLOB • In the simple query scenario, an error message is displayed for the

Description	Syntax	Difference

		preceding calculation operations in M-compatible mode. For example:
		m_db=# CREATE TABLE TEST (salary int(10));
		CREATE TABLE
		m_db=# INSERT INTO TEST VALUES(8000);
		INSERT 0 1
		m_db=# CREATE VIEW view1 AS SELECT salary/10 as te FROM TEST;
		ERROR: Unsupported type numeric used with expression in CREATE VIEW statement.
		m_db=# CREATE TABLE TEST (salary int(10));
		CREATE TABLE
		m_db=# INSERT INTO TEST VALUES(8000);
		INSERT 0 1
		m_db=# CREATE VIEW view2 AS SELECT sec_to_time(salary) as te FROM TEST;
		ERROR: Unsupported type time used with expression in CREATE VIEW statement.
		• In non-simple query scenarios such as composite query and subquery, the calculation operations of the preceding types in M-compatible mode are different from those in MySQL. In M-compatible mode, the data type column precision attribute of the created table is not retained.

Range of index names that can be duplicated	CREATE TABLE, CREATE INDEX	In MySQL, an index name is unique in a table. Different tables can have the same index name. In M-compatible mode, the index name must be unique in the same schema. In M-compatible mode, the same rules apply to constraints and keys that automatically create indexes.

Description	Syntax	Difference
View dependency differences	CREATE VIEW and ALTER TABLE	In MySQL, view storage records only the table name, column name, and database name of the target table, but does not record the unique identifier of the target table. GaussDB parses the SQL statement used for creating a view and stores the unique identifier of the target table. Therefore, the differences are as follows: 1. In MySQL, you can modify the data type of a column on which a view depends because the view is unaware of the modification of the target table. In GaussDB, such modification is forbidden and the attempt will fail. 2. In MySQL, you can rename a column on which a view depends because the view is unaware of the modification of the target table, but the view cannot be queried after the operation. In GaussDB, each column precisely stores the unique identifier of the corresponding table and column. Therefore, the column name in the table can be modified successfully without changing the column name in the view. In addition, the view can be queried after the operation.

Description	Syntax	Difference
Foreign key differences	CREATE TABLE	GaussDB foreign key constraints are insensitive to types. If the data types of the fields in the main and child tables are implicitly converted, foreign keys can be created. MySQL are sensitive to foreign key types. If the column types of the two tables are different, foreign keys cannot be created. MySQL does not allow you to modify the data type or name of a table column where the foreign key of the column is located by running **MODIFY COLUMN** or **CHANGE COLUMN**, but GaussDB supports such operation.
Differences in index ascending and descending orders	CREATE INDEX	In MySQL 5.7, **ASC | DESC** is parsed but ignored, and the default behavior is **ASC**. In MySQL 8.0 and GaussDB, **ASC | DESC** is parsed and takes effect.

Description	Syntax	Difference

Setting default values of columns	CREATE TABLE and ALTER TABLE	• For MySQL 5.7, only the default value without parentheses is supported. MySQL 8.0 and GaussDB support default values in parentheses.
		-- GaussDB
		m_db=# DROP TABLE IF EXISTS t1, t2;
		DROP TABLE
		m_db=# CREATE TABLE t1(a DATETIME DEFAULT NOW());
		CREATE TABLE
		m_db=# CREATE TABLE t2(a DATETIME DEFAULT (NOW()));
		CREATE TABLE
		
		-- MySQL5.7
		mysql> DROP TABLE IF EXISTS t1, t2;
		Query OK, 0 rows affected (0.04 sec)
		
		mysql> CREATE TABLE t1(a DATETIME DEFAULT NOW());
		Query OK, 0 rows affected (0.04 sec)
		
		mysql> CREATE TABLE t2(a DATETIME DEFAULT (NOW()));
		ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '(NOW()))' at line 1
		
		-- MySQL8.0
		mysql> DROP TABLE IF EXISTS t1, t2;
		Query OK, 0 rows affected (0.17 sec)
		
		mysql> CREATE TABLE t1(a DATETIME DEFAULT NOW());
		Query OK, 0 rows affected (0.19 sec)
		
		mysql> CREATE TABLE t2(a DATETIME DEFAULT (NOW()));
		Query OK, 0 rows affected (0.20 sec)
		• In MySQL, when specifying default values for BLOB, TEXT, and JSON data types, you must add parentheses to the default values. In GaussDB, you do not need to add parentheses when specifying default values

Description	Syntax	Difference

		for the preceding data types.
		● When the default value is specified, GaussDB does not check whether the default value overflows. When the default value without parentheses is specified in MySQL, MySQL checks whether the default value overflows. When the default value with parentheses is specified, MySQL does not check whether the default value overflows.
		● In GaussDB, time constants starting with DATE, TIME, or TIMESTAMP can be used to specify default values for columns. In MySQL, when time constants starting with DATE, TIME, or TIMESTAMP are used to specify default values for columns, parentheses must be added to the default values.
		-- GaussDB
		m_db=# DROP TABLE IF EXISTS t1, t2;
		DROP TABLE
		m_db=# CREATE TABLE t1(a TIMESTAMP DEFAULT TIMESTAMP '2000-01-01 00:00:00');
		CREATE TABLE
		m_db=# CREATE TABLE t2(a TIMESTAMP DEFAULT (TIMESTAMP '2000-01-01 00:00:00'));
		CREATE TABLE
		
		-- MySQL5.7
		mysql> DROP TABLE IF EXISTS t1, t2;
		Query OK, 0 rows affected (0.02 sec)
		
		mysql> CREATE TABLE t1(a TIMESTAMP DEFAULT TIMESTAMP '2000-01-01 00:00:00');
		ERROR 1067 (42000): Invalid default value for 'a'
		mysql> CREATE TABLE t2(a TIMESTAMP DEFAULT (TIMESTAMP '2000-01-01 00:00:00'));
		ERROR 1064 (42000): You have an error in your SQL syntax; check the

Description	Syntax	Difference

		manual that corresponds to your MySQL server version for the right syntax to use near '(TIMESTAMP '2000-01-01 00:00:00'))' at line 1
		
		-- MySQL8.0
		mysql> DROP TABLE IF EXISTS t1, t2;
		Query OK, 0 rows affected (0.14 sec)
		
		mysql> CREATE TABLE t1(a TIMESTAMP DEFAULT TIMESTAMP '2000-01-01 00:00:00');
		ERROR 1067 (42000): Invalid default value for 'a'
		mysql> CREATE TABLE t2(a TIMESTAMP DEFAULT (TIMESTAMP '2000-01-01 00:00:00'));
		Query OK, 0 rows affected (0.19 sec)

3.8.4 DML

Table 3-29 DML syntax compatibility

No.	Description	Syntax	Difference
1	DELETE supports deleting data from a specified partition (or subpartition).	DELETE	-
2	UPDATE supports ORDER BY and LIMIT.	UPDATE	-
3	Support the SELECT INTO syntax.	SELECT	• In GaussDB, you can use SELECT INTO to create a table based on the query result. MySQL does not support this function. • In GaussDB, the SELECT INTO syntax does not support the query result that is obtained after the set operation of multiple queries is performed.

No.	Description	Syntax	Difference

4	Support the REPLACE INTO syntax.	REPLACE	Difference between the initial values of the time type. For example:
			• MySQL is not affected by the strict or loose mode. You can insert time 0 into a table.
			mysql> CREATE TABLE test(f1 TIMESTAMP NOT NULL, f2 DATETIME NOT NULL, f3 DATE NOT NULL);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> REPLACE INTO test VALUES(f1, f2, f3);
			Query OK, 1 row affected (0.00 sec)
			
			mysql> SELECT * FROM test;
			+---------------------+---------------------+------------+
			| f1 | f2 | f3 |
			+---------------------+---------------------+------------+
			| 0000-00-00 00:00:00 | 0000-00-00 00:00:00 | 0000-00-00 |
			+---------------------+---------------------+------------+
			1 row in set (0.00 sec)
			• The time 0 can be successfully inserted only when GaussDB is in loose mode.
			gaussdb=# SET sql_mode = '';
			SET
			gaussdb=# CREATE TABLE test(f1 TIMESTAMP NOT NULL, f2 DATETIME NOT NULL, f3 DATE NOT NULL);
			CREATE TABLE
			gaussdb=# REPLACE INTO test VALUES(f1, f2, f3);
			REPLACE 0 1
			gaussdb=# SELECT * FROM test;
			f1 | f2 | f3
			---------------------+---------------------+------------
			0000-00-00 00:00:00 | 0000-00-00 00:00:00 | 0000-00-00
			(1 row)
			In strict mode, the error "Incorrect Date/Time/Datetime/Timestamp/Year value" is reported.

5	SELECT supports multi-partition query.	SELECT	-
6	UPDATE supports multi-partition update.	UPDATE	-

No.	Description	Syntax	Difference
7	Import data by using LOAD DATA.	LOAD DATA	When LOAD DATA is used to import data, GaussDB differs from MySQL in the following aspects: • The execution result of the LOAD DATA syntax is the same as that in M* strict mode. The loose mode is not adapted currently. • The **IGNORE** and **LOCAL** parameters are used only to ignore the conflicting rows when the imported data conflicts with the data in the table and to automatically fill default values for other columns when the number of columns in the file is less than that in the table. Other functions are not supported currently. • If the keyword LOCAL is specified and the file path is a relative path, the file is searched from the binary directory. If the keyword LOCAL is not specified and the file path is a relative path, the file is searched from the data directory. • LOAD DATA can only be used to import files from the server. • The **[(col_name_or_user_var [, col_name_or_user_var]...)]** parameter cannot be used to specify a column repeatedly. • The newline character specified by **[FIELDS TERMINATED BY 'string']** cannot be the same as the separator specified by **[LINES TERMINATED BY'string']**. • If the data written to a table by running **LOAD DATA** cannot be converted to the data type of the table, an error is reported. • The LOAD DATA SET expression does not support the calculation of a specified column name. • LOAD DATA applies only to tables but not views.

No.	Description	Syntax	Difference
			• The default newline character of the file in Windows is different from that in Linux. LOAD DATA cannot identify this scenario and reports an error. You are advised to check the newline character at the end of lines in the file to be imported.
8	INSERT supports the VALUES reference column syntax.	INSERT INTO tabname VALUES(1,2,3) ON DUPLICATE KEY UPDATE b = VALUES(column_name)	The format of *table-name.column-name* is not supported by VALUES() in the ON DUPLICATE KEY UPDATE clause in GaussDB, but is supported in MySQL.
9	LIMIT differences	DELETE, SELECT, and UPDATE	The LIMIT clauses of each statement in GaussDB are different from those in MySQL. The maximum parameter value of LIMIT (of the BIG INT type) in GaussDB is **9223372036854775807**. If the actual value exceeds the number, an error is reported. In MySQL, the maximum value of LIMIT (of the unsigned LONGLONG type) is **18446744073709551615**. If the actual value exceeds the number, an error is reported. You can set a small value in LIMIT, which is rounded off during execution. The value cannot be a decimal in MySQL. In GaussDB, limit 0 is not allowed in the DELETE statement. In MySQL, limit 0 is allowed in the DELETE statement.

No.	Description	Syntax	Difference
10	Difference in using backslashes (\)	INSERT	The usage of backslashes (\) can be determined by parameters in GaussDB and MySQL, but their default usages are different. In MySQL, the **NO_BACKSLASH_ESCAPES** parameter is used to determine whether backslashes (\) in character strings and identifiers are parsed as common characters or escape characters. By default, backslashes (\) are parsed as escape characters in character strings and identifiers. If **set sql_mode** is set to **'NO_BACKSLASH_ESCAPES'**, backslashes (\) cannot be parsed as escape characters in character strings and identifiers. In GaussDB, the **standard_conforming_strings** parameter is used to determine whether backslashes (\) in character strings and identifiers are parsed as common characters or escape characters. The default value is **on**, indicating that backslashes (\) are parsed as common text in common character string texts according to the SQL standard. If **set standard_conforming_strings** is set to **off**, backslashes (\) can be parsed as escape characters in character strings and identifiers.
11	If the inserted value is less than the number of columns, MySQL reports an error while GaussDB supplements null values.	INSERT	In GaussDB, if the column list is not specified and the inserted value is less than the number of columns, values are assigned based on the column sequence when the table is created by default. If a column has a NOT NULL constraint, an error is reported. If no NOT NULL constraint exists and a default value is specified, the default value is added to the column. If no default value is specified, **null** is added.

No.	Description	Syntax	Difference
12	The columns sorted in ORDER BY must be included in the columns of the result set.	SELECT	In GaussDB, when used with the GROUP BY clause, the columns to be sorted in ORDER BY must be included in the columns of the result set retrieved by the SELECT statement. When used with the DISTINCT keyword, the columns to be sorted in ORDER BY must be included in the columns of the result set retrieved by the SELECT statement.
13	Do not use ON DUPLICATE KEY UPDATE to modify constraint columns.	INSERT	-
14	Duplicate column names are allowed in the SELECT result.	SELECT	-
15	NATURAL JOIN in GaussDB is different from that in MySQL.	SELECT	In GaussDB, NATURAL [[LEFT | RIGHT] OUTER] JOIN allows you not to specify **LEFT | RIGHT**. If **LEFT | RIGHT** is not specified, **NATURAL OUTER JOIN** is **NATURAL JOIN**. You can use JOIN consecutively.
16	If the foreign key data type is timestamp or datetime, an error is reported for attempts to update or delete the foreign table.	UPDATE /DELETE	If the foreign key data type is timestamp or datetime, an error is reported for attempts to update or delete the foreign table, but in MySQL the table can be updated or deleted.

No.	Description	Syntax	Difference

17	Compatibility in terms of nature join and using	SELECT	• In GaussDB, join sequence is strictly from left to right. MySQL may adjust the sequence.
			• In GaussDB and MySQL, columns involving **join** in the left or right table cannot be ambiguous during natural join or using. (Generally, ambiguity is caused by duplicate names of columns in the left or right temporary table.) The join sequence differs in two databases, which may lead to different behaviors.
			– Behavior in GaussDB:
			m_regression=# CREATE TABLE t1(a int,b int);
			CREATE TABLE
			m_regression=# CREATE TABLE t2(a int,b int);
			CREATE TABLE
			m_regression=# CREATE TABLE t3(a int,b int);
			CREATE TABLE
			m_regression=# SELECT * FROM t1 JOIN t2;
			a | b | a | b
			---+---+---+---
			(0 rows)
			m_regression=# SELECT * FROM t1 JOIN t2 natural join t3; -- Failed. Duplicate contents exist in columns **a** and **b** of the temporary table obtained by **t1 join t2**. Therefore, there is ambiguity in nature join.
			ERROR: common column name "a" appears more than once in left table
			– Behavior in MySQL:
			mysql> SELECT * FROM t1 JOIN t2 NATURAL JOIN t3;
			Empty set (0.00 sec)
			mysql> SELECT * FROM (t1 join t2) NATURAL JOIN t3;
			ERROR 1052 (23000): Column 'a' in from clause is ambiguous

18	The WITH clause is compatible with MySQL 8.0.	SELECT, INSERT, UPDATE, and DELETE	-
19	Compatibility in terms of join	SELECT	Commas (,) cannot be used as a way of join in GaussDB, but can be used in MySQL. GaussDB does not support use index for join.

No.	Description	Syntax	Difference
20	If the column expression in the SELECT statement is a function expression or arithmetic expression, the column name in the query result is **?column?**.	SELECT	In GaussDB, if the column expression in the SELECT statement is a function expression or arithmetic expression, the column name in the query result is **?column?**. In MySQL, the name is the corresponding expression.
21	SELECT export file (into outfile)	SELECT ... INTO OUFILE ...	In the file exported by using the SELECT INTO OUTFILE syntax, the display precision of values of the FLOAT, DOUBLE, and REAL types in GaussDB is different from that in MySQL. The syntax does not affect the import using COPY the values after import.
22	UPDATE/INSERT/ REPLACE ... SET specifies the schema name and table name.	UPDATE / INSERT/ REPLACE ... SET	The three-segment format for UPDATE/REPLACE SET is *database.table.column* in MySQL, and is *table.column.filed* in GaussDB, where *filed* indicates the attribute in the specified composite type. For INSERT ... SET, MySQL supports *column*, *table.column*, and *database.table.column*. GaussDB supports only *column* and does not support *table.column* and *database.table.column*.
23	The execution sequence of UPDATE SET is different from that of MySQL.	UPDATE ... SET	In MySQL, UPDATE SET is performed in sequence. The results of UPDATE at the front affect subsequent results of UPDATE, and the same column can be set for multiple times. In GaussDB, all related data is obtained first, and then UPDATE is performed on the data at a time. The same column cannot be set for multiple times.
24	IGNORE feature	UPDATE / DELETE/ INSERT	The execution process in MySQL is different from that in GaussDB. Therefore, the number and information of generated warnings may be different.

No.	Description	Syntax	Difference
25	SHOW COLUMNS syntax	SHOW	• User permission verification is different from that of MySQL. – In GaussDB, you need the USAGE permission on the schema of a specified table and table-level or column-level permissions on the specified table. Only information about columns with the SELECT, INSERT, UPDATE, REFERENCES, and COMMENT permissions is displayed. – In MySQL, you need table-level or column-level permissions on a specified table. Only information about columns with the SELECT, INSERT, UPDATE, REFERENCES, and COMMENT permissions is displayed. • When the LIKE and WHERE clauses involve string comparison operations, the collation is different from that in MySQL. – **utf8_general_ci** is used in MySQL. – The **collation_connection** of the current client is used as the collation in GaussDB. In GaussDB, you are advised not to select columns other than the returned fields in the WHERE clause. Otherwise, unexpected errors may occur. -- Expected error m_db=# SHOW FULL COLUMNS FROM t02 WHERE `b`='pri'; ERROR: Column "b" does not exist. LINE 1: SHOW FULL COLUMNS FROM t02 WHERE `b`='pri'; ^ -- Unexpected error m_db=# SHOW FULL COLUMNS FROM t02 WHERE `c`='pri'; ERROR: input of anonymous composite types is not implemented LINE 1: SHOW FULL COLUMNS FROM t02 WHERE `c`='pri'; ^

No.	Description	Syntax	Difference
26	SHOW CREATE DATABASE syntax	SHOW	User permission verification is different from that of MySQL. ● In GaussDB, you need the USAGE permission on a specified schema. ● In MySQL, you need database-level permissions (except GRANT OPTION and USAGE), table-level permissions (except GRANT OPTION), or column-level permissions.

No.	Description	Syntax	Difference
27	SHOW CREATE TABLE syntax	SHOW	• User permission verification is different from that of MySQL. – In GaussDB, you need the USAGE permission on the schema where a specified table is located and table-level permissions on the specified table. – Table-level permissions (except GRANT OPTION) of the specified table are required in MySQL. • The returned statements for table creation are different from those in MySQL. – In GaussDB, indexes are returned as CREATE INDEX statements. In MySQL, indexes are returned as CREATE TABLE statements. In GaussDB, the range of optional parameters supported by the CREATE INDEX syntax is different from that supported by the CREATE TABLE syntax. Therefore, some indexes cannot be created in CREATE TABLE statements. – In GaussDB, the **ENGINE** and **ROW_FORMAT** options of CREATE TABLE are adapted only for the syntax but do not take effect. Therefore, they are not displayed in the returned statements for table creation. • These statements are compatible with MySQL only after the compatibility parameter **m_format_dev_version** is set to **'s2'**. The compatibility parameter takes effect by changing the positions of column comments, table comments, **ON COMMIT** option for global temporary tables,

No.	Description	Syntax	Difference
			primary key and unique constraints (where the **USING INDEX TABLESPACE** option is no longer displayed), and index comments.
28	SHOW CREATE VIEW syntax	SHOW	• User permission verification is different from that of MySQL. – In GaussDB, you need the USAGE permission on the schema where a specified view is located and table-level permissions on the specified view. – In MySQL, you need the table-level SELECT and table-level SHOW VIEW permissions on the specified view. • The returned statements for view creation are different from those in MySQL. If a view is created in the format of **SELECT * FROM** *tbl_name*, * is not expanded in GaussDB but expanded in MySQL. • The *character_set_client* and *collation_connection* fields in the returned result are different from those in MySQL. – The session values of system variables *character_set_client* and *collation_connection* are displayed during view creation in MySQL – Related metadata is not recorded in GaussDB and **NULL** is displayed.

No.	Description	Syntax	Difference
29	SHOW PROCESSLIST syntax	SHOW	In GaussDB, the field content and case in the query result of this command are the same as those in the information_schema.processlist view. In MySQL, the field content and case may be different. • In GaussDB, common users can access only their own thread information. Users with the SYSADMIN permission can access thread information of all users. • In MySQL, common users can access only their own thread information. Users with the PROCESS permission can access thread information of all users.
30	SHOW [STORAGE] ENGINES	SHOW	In GaussDB, the field content and case of the query result of this command are the same as those in the information_schema.engines view. In MySQL, they may be different from those in the view. The query results of this command are different in MySQL and GaussDB because the databases have different storage engines.
31	SHOW [SESSION] STATUS	SHOW	In GaussDB, the field content and case of the query result of this command are the same as those in the information_schema.session_status view. In MySQL, they may be different from those in the view. Currently, GaussDB supports only **Threads_connected** and **Uptime**.
32	SHOW [GLOBAL] STATUS	SHOW	In GaussDB, the field content and case of the query result of this command are the same as those in the information_schema.global_status view. In MySQL, they may be different from those in the view. Currently, GaussDB supports only **Threads_connected** and **Uptime**.

No.	Description	Syntax	Difference
33	SHOW INDEX	SHOW	• User permission verification is different from that of MySQL. – In GaussDB, you need the USAGE permission on a specified schema and table-level or column-level permissions on a specified table. – In MySQL, you need table-level (except GRANT OPTION) or column-level permission on the specified table. • Temporary tables in GaussDB are stored in independent temporary schemas. When using the FROM or IN db_name condition to display the index information of a specified temporary table, you must specify **db_name** as the schema where the temporary table is located. Otherwise, the system displays a message indicating that the temporary table does not exist. This is different from MySQL in some cases.
34	SHOW SESSION VARIABLES	SHOW	In GaussDB, the field content and case of the query result are the same as those in the information_schema.session_variables view. In MySQL, they may be different from those in the view.
35	SHOW GLOBAL VARIABLES	SHOW	In GaussDB, the field content and case of the query result of this command are the same as those in the information_schema.global_variables view. In MySQL, they may be different from those in the view.
36	SHOW CHARACTER SET	SHOW	In GaussDB, the field content and case of the query result are the same as those in the information_schema.character_sets view. In MySQL, they may be different from those in the view.

No.	Description	Syntax	Difference
37	SHOW COLLATION	SHOW	In GaussDB, the field content and case of the query result are the same as those in the information_schema.collations view. In MySQL, they may be different from those in the view.
38	EXCEPT Syntax	SELECT	-
39	SELECT supports the STRAIGHT_JOIN syntax.	SELECT	The execution plans generated in the multi-table JOIN scenarios in GaussDB may be different from those in MySQL.
40	SHOW TABLES	SHOW	• The LIKE behavior is different. For details, see "LIKE" in **Operators**. • The WHERE expression behavior is different. For details, see "WHERE" in GaussDB. • In GaussDB, permissions on tables and databases must be assigned to users separately. The database to be queried must be available to users on the SHOW SCHEMAS. Users must have permissions on both tables and databases. MySQL can be accessed as long as you have table permissions. • In GaussDB, the verification logic preferentially checks whether a schema exists and then checks whether the current user has the permission on the schema, which is different from that in MySQL.

No.	Description	Syntax	Difference
41	SHOW TABLE STATUS	SHOW	• In GaussDB, the syntax displays data depending on the tables view under information_schema. In MySQL, the tables view specifies tables. • In GaussDB, permissions on tables and databases must be assigned to users separately. The database to be queried must be available to users on the SHOW SCHEMAS. Users must have permissions on both tables and databases. MySQL can be accessed as long as you have table permissions. • In GaussDB, the verification logic preferentially checks whether a schema exists and then checks whether the current user has the permission on the schema, which is different from that in MySQL.
42	HAVING syntax	SELECT	In GaussDB, HAVING can only reference columns in the GROUP BY clause or columns used in aggregate functions. However, MySQL supports more: it allows HAVING to reference **SELECT** columns in the list and columns in external subqueries.

43	SELECT followed by a row expression	SELECT	In MySQL, SELECT cannot be followed by a row expression, but in GaussDB, SELECT can be followed by a row expression.
			Behavior in MySQL:
			`mysql> SELECT row(1,2);`
			`ERROR 1241 (21000): Operand should contain 1 column(s)`
			Behavior in GaussDB:
			`m_db=# SELECT row(1,2);`
			` row(1,2)`
			`----------`
			` (1,2)`
			`(1 row)`

No.	Description	Syntax	Difference
44	SELECT FOR SHRAE/FOR UPDATE/ LOCK IN SHRAE MODE	SELECT	• The FOR SHARE/FOR UPDATE/ LOCK IN SHARE MODE and UNION/EXCEPT/DISTINCT/ GROUP BY/HAVING clauses cannot be used together in GaussDB. They can be used together in MySQL 5.7 (except in the FOR SHARE/EXCEPT syntax) and MySQL 8.0. • When a lock clause is used together with the LEFT/RIGHT [OUTER] JOIN clause, the LEFT JOIN cannot be used to lock the right table, and the RIGHT JOIN clause cannot be used to lock the left table. In MySQL, tables on both sides of JOIN can be locked at the same time.

No.	Description	Syntax	Difference

45	SELECT syntax	SELECT	• In GaussDB, when the table alias in the FROM clause is specified, the table alias can contain the column name. In MySQL 5.7, the table alias cannot contain the column name. In MySQL 8.0, the table alias can contain the column name only when the subquery is specified.
			-- GaussDB
			m_db=# DROP TABLE IF EXISTS t1;
			DROP TABLE
			m_db=# CREATE TABLE t1(a INT, b INT);
			CREATE TABLE
			m_db=# INSERT INTO t1 VALUES(1,2);
			INSERT 0 1
			m_db=# SELECT * FROM t1 t2(a, b);
			a | b
			---+---
			1 | 2
			(1 row)
			
			m_db=# SELECT * FROM (SELECT * FROM t1) t2(a, b);
			a | b
			---+---
			1 | 2
			(1 row)
			
			-- MySQL5.7
			mysql> DROP TABLE IF EXISTS t1;
			Query OK, 0 rows affected, 1 warning (0.00 sec)
			
			mysql> CREATE TABLE t1(a INT, b INT);
			Query OK, 0 rows affected (0.03 sec)
			
			mysql> INSERT INTO t1 VALUES(1,2);
			Query OK, 1 row affected (0.01 sec)
			
			mysql> SELECT * FROM t1 t2(a, b);
			ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '(a, b)' at line 1
			mysql> SELECT * FROM (SELECT * FROM t1) t2(a, b);
			ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '(a, b)' at line 1
			
			-- MySQL8.0
			mysql> DROP TABLE IF EXISTS t1;
			Query OK, 0 rows affected (0.10 sec)
			
			mysql> CREATE TABLE t1(a INT, b INT);
			Query OK, 0 rows affected (0.18 sec)
			
			mysql> INSERT INTO t1 VALUES(1,2);
			Query OK, 1 row affected (0.03 sec)
			
			mysql> SELECT * FROM t1 t2(a, b);

No.	Description	Syntax	Difference

			ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '(a, b)' at line 1
			mysql> SELECT * FROM (SELECT * FROM t1) t2(a, b);
			+------+------+
			| a | b |
			+------+------+
			| 1 | 2 |
			+------+------+
			1 row in set (0.00 sec)
			● If a query statement does not contain the FROM clause, GaussDB supports the WHERE clause, which is the same as that in MySQL 8.0. MySQL 5.7 does not support the WHERE clause.
			-- GaussDB
			m_db=# SELECT 1 WHERE true;
			1
			--- 	
			1
			(1 row)
			
			-- MySQL5.7
			mysql> SELECT 1 WHERE true;
			ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'where true' at line 1
			
			-- MySQL8.0
			mysql> SELECT 1 WHERE true;
			+---+
			| 1 |
			+---+
			| 1 |
			+---+
			1 row in set (0.00 sec)

3.8.5 DCL

Table 3-30 DCL syntax compatibility

No.	Description	Syntax	Difference
1	Set names with COLLATE specified.	SET [SESSION | LOCAL] NAMES {'charset_name' [COLLATE 'collation_name'] | DEFAULT};	GaussDB does not allow **charset_name** to be different from the database character set. For details, see "SQL Reference > SQL Syntax > SQL Statements > S > SET" in the *M-compatible Developer Guide*.

3.8.6 Other Statements

Table 3-31 Compatibility of other syntaxes

No.	Description	Syntax	Difference
1	Transaction-related syntax	Default database isolation level	The default isolation level of M-compatible mode is READ COMMITTED, and that of MySQL is REPEATABLE READ. Only the READ COMMITTED and REPEATABLE READ isolation levels take effect in M-compatible databases.
2	Transaction-related syntax	Transaction nesting	In M-compatible mode, nested transactions are not automatically committed, but in MySQL, they are automatically committed.
3	Transaction-related syntax	Autocommit	In M-compatible mode, GaussDB is used for storage and the GaussDB transaction mechanism is inherited. If DDL or DCL is executed in a transaction, the transaction is not automatically committed. In MySQL, if DDL, DCL, management-related, or lock-related statements are executed, the transaction is automatically committed.
4	Transaction-related syntax	Rollback is required after an error is reported.	If an error is reported for a transaction in an M-compatible database, rollback needs to be performed. There is no such restriction in MySQL.

No.	Description	Syntax	Difference
5	Transaction-related syntax	Lock mechanism	The M-compatible lock mechanism can be used only in transaction blocks. There is no such restriction in MySQL.
6	Lock mechanism	Lock mechanism	• After the read lock is obtained, write operations cannot be performed on the current session in MySQL, but write operations can be performed on the current session in an M-compatible database. • After MySQL locks a table, an error is reported when other tables are read. M-compatible does not have such restriction. • In MySQL, if the lock of the same table is obtained in the same session, the previous lock is automatically released and the transaction is committed. M-compatible databases do not have this mechanism. • M-compatible databases allow LOCK TABLE to be used only inside a transaction block, and have no UNLOCK TABLE command. Locks are always released at the end of transactions.
7	PBE	PBE	• In an M-compatible database, if a PREPARE statement with the same name is repeatedly created, an error is reported, indicating that the statement already exists. You need to delete the existing statement first. In MySQL, the old statement will be overwritten. • M-compatible databases and MySQL report errors in different phases, such as the parsing layer and execution layer, during SQL statement execution. PREPARE statements process prepared statements till the parsing layer. Therefore, in abnormal scenarios in PBE, an M-compatible database may be different from that in MySQL in terms of whether the error is reported in the PREPARE or EXECUTE phase.

3.8.7 Users and Permissions

Description

In M-compatible mode, the behaviors and syntaxes related to user and permission control inherit the GaussDB mechanism but are not synchronized with those in MySQL.

User and permission behaviors are the same as those in GaussDB. For details, see "Database Security Management > Managing Users and Their Permissions" in *Developer Guide*.

Some syntaxes for users and permissions are tailored in GaussDB. For details about the syntaxes, see "SQL Reference > SQL Syntax > SQL Statements" in *M-Compatibility Developer Guide*. For details about the syntax differences between an M-compatible database and GaussDB, see **Table 3-32**.

When a user is created, a schema with the same name as the user is automatically created in an M-compatible database, but it is not created in MySQL.

Table 3-32 Syntax differences between an M-compatible database and GaussDB

No.	Syntax	Description	Difference
1	CREATE ROLE	Creates a role.	In an M-compatible database: Options involving the following keywords cannot be specified: **ENCRYPTED**, **UNENCRYPTED**, **RESOURCE POOL**, **PERM SPACE**, **TEMP SPACE**, and **SPILL SPACE**.
2	CREATE USER	Creates a user.	
3	CREATE GROUP	Creates a user group. CREATE GROUP is the alias of CREATE ROLE and is not recommended.	
4	ALTER ROLE	Modifies role attributes.	
5	ALTER UER	Modifies user attributes.	
6	ALTER GROUP	Modifies the attributes of a user group.	-
7	DROP ROLE	Deletes a role.	-
8	DROP USER	Deletes a user.	-
9	DROP GROUP	Deletes a user group.	-
10	DROP OWNED	Deletes the database objects owned by a database role.	-
11	REASSIGN OWNED	Changes the owner of a database object.	This syntax is not supported in an M-compatible database.

No.	Syntax	Description	Difference
12	GRANT	Grants permissions to roles and users.	In an M-compatible database, permissions on objects such as functions, stored procedures, tablespaces, and database links cannot be granted or revoked.
13	REVOKE	Revokes permissions from one or more roles.	
14	ALTER DEFAULT PRIVILEGES	Sets the permissions that will be granted to objects created in the future. (It does not affect permissions granted to existing objects.)	This syntax is not supported in an M-compatible database.

Differences

- Syntax format differences

  For details about the M-compatible permission granting syntaxes, see "SQL Reference > SQL Syntax > G > GRANT" in *M-Compatibility Developer Guide*. The permission granting syntax in MySQL is as follows:

```
-- Global, database-level, table-level, and stored procedure–level permission granting syntax
GRANT
    priv_type [(column_list)]
      [, priv_type [(column_list)]] ...
    ON [object_type] priv_level
    TO user [auth_option] [, user [auth_option]] ...
    [REQUIRE {NONE | tls_option [[AND] tls_option] ...}]
    [WITH {GRANT OPTION | resource_option} ...]

-- Syntax for granting permissions to a user proxy
GRANT PROXY ON user
    TO user [, user] ...
    [WITH GRANT OPTION]

object_type: {
    TABLE
  | FUNCTION
  | PROCEDURE
}

priv_level: {
    *
  | *.*
  | db_name.*
  | db_name.tbl_name
  | tbl_name
  | db_name.routine_name
}

user:
    'user_name'@'host_name'

auth_option: {
    IDENTIFIED BY 'auth_string'
  | IDENTIFIED WITH auth_plugin
  | IDENTIFIED WITH auth_plugin BY 'auth_string'
```



```
  | IDENTIFIED WITH auth_plugin AS 'auth_string'
  | IDENTIFIED BY PASSWORD 'auth_string'
}

tls_option: {
    SSL
  | X509
  | CIPHER 'cipher'
  | ISSUER 'issuer'
  | SUBJECT 'subject'
}

resource_option: {
  | MAX_QUERIES_PER_HOUR count
  | MAX_UPDATES_PER_HOUR count
  | MAX_CONNECTIONS_PER_HOUR count
  | MAX_USER_CONNECTIONS count
}
```

- Differences in types of permissions granted

  In MySQL, the following types of permissions can be granted.

  Table 3-33 Types of permissions that can be granted in MySQL

Permission Type	Definition and Permission Level
ALL [PRIVILEGES]	Grants all permissions of a specified access level, except **GRANT OPTION** and **PROXY**.
ALTER	Enables **ALTER TABLE**. Level: global, database, and table.
ALTER ROUTINE	Allows you to modify or delete stored procedures. Level: global, database, and routine.
CREATE	Enables database and table creation. Level: global, database, and table.
CREATE ROUTINE	Enables stored procedure creation. Level: global and database.
CREATE TABLESPACE	Allows you to create, modify, or delete tablespaces or log file groups. Level: global.
CREATE TEMPORARY TABLES	Enables **CREATE TEMPORARY TABLE**. Level: global and database.
CREATE USER	Enable **CREATE USER**, **DROP USER**, **RENAME USER**, and **REVOKE ALL PRIVILEGES**. Level: global.
CREATE VIEW	Allows you to create or modify views. Level: global, database, and table.
DELETE	Enables **DELETE**. Level: global, database, and table.

Permission Type	Definition and Permission Level
DROP	Allows you to delete databases, tables, or views. Level: global, database, and table.
EVENT	Enables scheduled tasks. Level: global and database.
EXECUTE	Allows you to execute stored procedures. Level: global, database, and stored procedure.
FILE	Allows you to enable the server to read or write files. Level: global.
GRANT OPTION	Allows you to grant permissions to or remove permissions from other accounts. Level: global, database, table, stored procedure, and proxy.
INDEX	Allows you to create or delete indexes. Level: global, database, and table.
INSERT	Enables **INSERT**. Level: global, database, table, and column.
LOCK TABLES	Enables LOCK TABLES on tables with the SELECT permission. Level: global and database.
PROCESS	Allows you to view all running threads through **SHOW PROCESSLIST**. Level: global.
PROXY	Enables a user proxy. Level: from user to user.
REFERENCES	Enables foreign key creation. Level: global, database, table, and column.
RELOAD	Enables **FLUSH**. Level: global.
REPLICATION CLIENT	Allows you to query the location of the source server or replica server. Level: global.
REPLICATION SLAVE	Allows replicas to read binary logs from the source. Level: global.
SELECT	Enables **SELECT**. Level: global, database, table, and column.
SHOW DATABASES	Enables **SHOW DATABASES** to display all databases. Level: global.

Permission Type	Definition and Permission Level
SHOW VIEW	Enables **SHOW CREATE VIEW**. Level: global, database, and table.
SHUTDOWN	Enables **mysqladmin shutdown**. Level: global.
SUPER	Enables other management operations, such as the **CHANGE MASTER TO**, **KILL**, **PURGE BINARY LOGS**, **SET GLOBAL**, and **mysqladmin debug** commands. Level: global.
TRIGGER	Enables **TRIGGER**. Level: global, database, and table.
UPDATE	Enables **UPDATE**. Level: global, database, table, and column.
USAGE	Equivalent to "no privilege".

M-compatible databases support the following permissions by level:

Table 3-34 Types of permissions that can be granted in M-compatible databases

Object	Permissions That Can Be Granted
Schema	CREATE, USAGE, ALTER, DROP, and COMMENT
Table and view	SELECT, INSERT, UPDATE, DELETE, TRUNCATE, REFERENCES, TRIGGER, ALTER, DROP, COMMENT, INDEX, and VACUUM
Column	SELECT, INSERT, UPDATE, REFERENCES, and COMMENT
Sequence	SELECT, USAGE, UPDATE, ALTER, DROP, and COMMENT

- The schema-level objects to which permissions are granted are represented by **'dbname.*'** in MySQL, but **'{DATABASE | SCHEMA} dbname'** in M-compatible databases.
- In MySQL, a username consists of two parts: *username*@*hostname*, but a username is only itself in M-compatible databases.
- MySQL allows you to modify user authentication, secure connection, and resource parameter attributes (including **auth_option**, **tls_option**, and **resource option**) with the GRANT syntax. In M-compatible databases,

permission granting syntax does not support this function, and you need to use CREATE USER and ALTER USER to set user attributes.

- MySQL supports permission granting with a user proxy. GRANT PROXY ON is used to manage permissions of users in a unified manner. MySQL 5.7 does not provide the role mechanism, but MySQL 8.0 and M-compatible databases provide the role mechanism. If a role can manage and control the permissions of users in a unified manner, it can replace GRANT PROXY ON.
- M-compatible databases have a concept called public. All users have public permissions and they can query some system catalogs and system views. Users can grant or revoke public permissions. In MySQL, newly created users have only the global usage permission, which is almost low to none. They have only the permission to connect to the database and query the information_schema database.
- In M-compatible databases, the owner of an object has all permissions on the object by default. For security purposes, the owner can discard some permissions. However, ALTER, DROP, COMMENT, INDEX, VACUUM, and re-grantable permissions on the object are implicitly inherent permissions of the owner: MySQL does not have a concept called owner. Even if a user creates a table, the user cannot perform operations such as IUD on the table without being granted the corresponding permissions.
- In MySQL, All users have the USAGE permission, which indicates no permission. When **REVOKE** or **GRANT USAGE** is executed, no modification is performed. In M-compatible databases, the USAGE permission has the following meanings:
  - For schemas, USAGE allows access to objects contained in the schema. Without this permission, it is still possible to see the object names.
  - For sequences, USAGE allows use of the nextval function.
- In M-compatible databases, administrator roles can be set for users, including system administrator (SYSADMIN), security administrator (CREATEROLE), audit administrator (AUDITADMIN), monitor administrator (MONADMIN), O&M administrator (OPRADMIN), and security policy administrator (POLADMIN). By default, the system administrator with the SYSADMIN attribute has the highest permission in the system. After separation of duties is enabled, the system administrator does not have the CREATEROLE attribute (security administrator) or the AUDITADMIN attribute (audit administrator). That is, the system administrator can neither create roles or users, nor view or maintain database audit logs. In MySQL, administrator roles cannot be set for users, and there is no design for separation of duties.
- In M-compatible databases, the ANY permission can be granted to a user, indicating that the user can have the corresponding permission in non-system mode, including CREATE ANY TABLE, SELECT ANY TABLE, and CREATE ANY INDEX. In MySQL, ANY permission cannot be granted.
- MySQL provides **SHOW GRANTS** to query user permissions. In M-compatible databases, you can run a gsql client meta-command **'\l+'**, **'\dn+'**, or **'\dp'** to query permission information, or query related columns in system catalogs such as pg_namespace, pg_class, and pg_attribute for permission information.
- When a database, table, or column is deleted from MySQL, the related permission granting information is still retained in the system catalog. If an object with the same name is created again, the user still has the original permissions. In M-compatible databases, when a database, table, or column is

deleted, related permission granting information is deleted. If an object with the same name is created again, permissions need to be granted again.

- When granting database-level permissions, MySQL supports fuzzy match of database names using underscores (_) and percent signs (%). However, M-compatible databases do not support fuzzy match of object names using special characters such as underscores (_) or percent signs (%), which are identified as common characters.
- In MySQL, if a user specified in the GRANT statement does not exist, a user account is created by default (this feature has been removed from MySQL 8.0). In M-compatible databases, permissions cannot be granted to users who are not created.

3.8.8 System Catalogs and System Views

Table 3-35 Differences between M-compatible databases and GaussDB in terms of system catalogs or views

No.	System Catalog or System View	Column	Difference
1	information_schema.columns	generation_expression	The output of this column varies due to different string concatenation logics of expressions in M-compatible mode and MySQL.
2	information_schema.columns	data_type	The output result of this column in M-compatible mode, having not been modified due to the data type format_type involved, is different from that in MySQL.
3	information_schema.columns	column_type	The output result of this column in M-compatible mode, having not been modified due to the data type format_type involved, is different from that in MySQL.

No.	System Catalog or System View	Column	Difference
4	information_schema.tables	engine	In M-compatible mode: • ENGINE is aligned with data of information_schema.engines. • In some system catalogs, ENGINE is left empty. • If the default table is an ASTORE table and **STORAGE_TYPE** is not specified, **ENGINE** is empty.
5	information_schema.tables	version	This column is not supported in M-compatible mode.
6	information_schema.tables	row_format	This column is not supported in M-compatible mode.
7	information_schema.tables	avg_row_length	In M-compatible mode, the result of dividing the size of the data files by the number of all tuples (including live tuples and dead tuples) is used. If there is no tuple in the table, the value is **null**.
8	information_schema.tables	max_data_length	This column is not supported in M-compatible mode.
9	information_schema.tables	data_free	In M-compatible mode, it indicates the result of (Number of dead tuples/ Total number of tuples) x Data file size. If there is no tuple in the table, the value is **null**.
10	information_schema.tables	check_time	This column is not supported in M-compatible mode.

No.	System Catalog or System View	Column	Difference
11	information_schema.tables	create_time	In M-compatible mode, this behavior of column is different from that in MySQL. When a view is created in MySQL, this column is set to **null**. In M-compatible mode, the actual table creation time is displayed. The value is **null** if it is a table or view provided by the database.
12	information_schema.tables	update_time	The value is **null** if it is a table or view provided by the M-compatible database.
13	information_schema.statistics	collation	The value can only be **A** or **D** but not NULL in M-compatible mode.
14	information_schema.statistics	packed	This column is not supported in M-compatible mode.
15	information_schema.statistics	sub_part	This column is not supported in M-compatible mode.
16	information_schema.statistics	comment	This column is not supported in M-compatible mode.
17	information_schema.partitions	subpartition_name	In M-compatible mode, if a partition is not a level-2 partition, the value is **null**.
18	information_schema.partitions	subpartition_ordinal_position	In M-compatible mode, if a partition is not a level-2 partition, the value is **null**.

No.	System Catalog or System View	Column	Difference
19	information_schema.partitions	partition_method	In M-compatible mode: Partitioning policy. If the partition is not a level-1 partition, the value is **null**. ● **'r'**: range partition. ● **'i'**: interval partition. ● **'l'**: list partition. ● **'h'**: hash partition
20	information_schema.partitions	subpartition_method	In M-compatible mode: Level-2 partitioning policy. If a partition is not a level-2 partition, the value is **null**. ● **'r'**: range partition. ● **'i'**: interval partition. ● **'l'**: list partition. ● **'h'**: hash partition
21	information_schema.partitions	partition_description	In M-compatible mode, level-1 partitions and level-2 partitions are distinguished.
22	information_schema.partitions	partition_expression	This column is not supported in M-compatible mode.
23	information_schema.partitions	subpartition_expression	This column is not supported in M-compatible mode.
24	information_schema.partitions	data_length	This column is not supported in M-compatible mode.
25	information_schema.partitions	max_data_length	This column is not supported in M-compatible mode.
26	information_schema.partitions	index_length	This column is not supported in M-compatible mode.
27	information_schema.partitions	data_free	This column is not supported in M-compatible mode.

No.	System Catalog or System View	Column	Difference
28	information_schema.partitions	create_time	This column is not supported in M-compatible mode.
29	information_schema.partitions	update_time	This column is not supported in M-compatible mode.
30	information_schema.partitions	check_time	This column is not supported in M-compatible mode.
31	information_schema.partitions	checksum	This column is not supported in M-compatible mode.
32	information_schema.partitions	partition_comment	This column is not supported in M-compatible mode.
33	information_schema.partitions	nodegroup	This column is not supported in M-compatible mode.

NOTE

- The precision range cannot be specified for the command output of the integer type in a view. For example, the bigint(1) type in MySQL corresponds to the bigint type in M-compatible mode, and the bigint(21) unsigned type in MySQL corresponds to the bigint unsigned type in M-compatible mode.
- The int type in MySQL corresponds to the integer type in M-compatible mode.
- M-compatible mode does not support columns of the set and enum types that are supported in MySQL. This version does not support or display **Column_priv** column in the m_schema.columns_priv view, **Table_priv,Column_priv** column in the m_schema.tables_priv view, **Routine_type,Proc_priv** column in the m_schema.procs_priv view, the **type,language,sql_data_access,is_deterministic,security_type,sql_mode** column in the m_schema.proc view, or the **type** column in the m_schema.func view.
- **table_rows**, **avg_row_length**, **data_length**, **data_free**, **index_length**, and **cardinality** in information_schema.tables and **cardinality** in information_schema.statistics are obtained based on statistics. Therefore, run **ANALYZE** to update statistics before viewing them. (If data is updated in the database, you are advised to delay running **ANALYZE**.)
- The index columns contained in information_schema.statistics must be complete table columns in the created indexes. If the index columns are expressions, they are not in this view.
- **table_row** in information_schema.partitions is obtained based on statistics. Before viewing the value, run **ANALYZE** to update the statistics. (If data is updated in the database, you are advised to delay running **ANALYZE**.)
- The format of the **grantee** column supported in MySQL is **'** *user_name* **'@'** *host_name* **'**. In the M-compatible database, it is the name of the user or role to which the permission is granted.
- For the **host** column supported in the M-compatible database, the **hostname** of the current node is returned.
- In MySQL, you need the permission before viewing m_schema.tables_priv, information_schema.user_privileges, information_schema.schema_privileges, information_schema.table_privileges, information_schema.column_privileges, m_schema.columns_priv, m_schema.func, and m_schema.procs_priv. In the M-compatible database, you can view them with the default permission. For example, for table **t1**, you need the corresponding permission in MySQL so that you can view the corresponding permission information in the permission view. In the M-compatible database, you can view the permission information related to table **t1** in the view.
- A system view in m_schema is a system catalog in MySQL.
- The collations of **VIEW_DEFINITION** in information_schema.views and **ROUTINE_DEFINITION** in information_schema.routines are not controlled.
- For the view fields of the character type listed in "Schemas" in *M-Compatibility Developer Guide*, the character set is utf8mb4, and the collation is utf8mb4_bin or utf8mb4_general_ci, and the collation priority is the priority of columns of data types that support collation described in "SQL Reference > Character Set and Collations > Rules for Combining Character Sets and Collations" in *M-Compatibility Developer Guide*. These features are different from those in MySQL.

