CodeArts PerfTest

Service Overview

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Contents

1 What Is CodeArts PerfTest?

Distributed architecture and microservice technologies have made applications more complex. This complexity results in architecture decoupling and performance improvements. However, it also makes it harder to locate performance problems in the production environment, and the repair periods become longer. Performance tests in advance of application launches are therefore necessary.

CodeArts PerfTest provides performance test services for cloud applications that are built based on HTTP, HTTPS, TCP, UDP, HLS, RTMP, WebSocket, MQTT, or HTTP-FLV. CodeArts PerfTest quickly simulates service peaks with a large number of concurrent users. It allows you to define the contents and time sequences of packets and supports complex combinations of multiple transactions. After tests are complete, CodeArts PerfTest provides professional test reports to evaluate your service quality.

CodeArts PerfTest simplifies performance pressure tests, helping you focus more on services and performance problems, reduce costs, enhance stability, optimize user experience, and improve the business value of enterprises.

Figure 1-1 CodeArts PerfTest
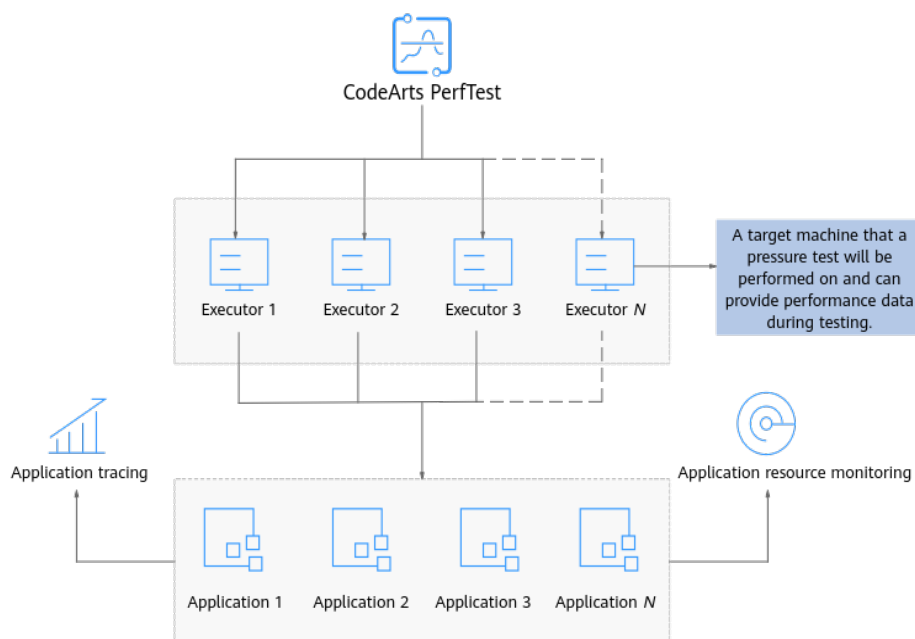
Functions

CodeArts PerfTest provides tests for HTTP/HTTPS/TCP/UDP/HLS/RTMP/
WebSocket/HTTP-FLV/MQTT applications with high user concurrency. It allows you
to flexibly define multi-protocol packet contents, transactions, and test task
models. You can view performance statistics, such as concurrency, RPS, and
response time during or after testing. You can also create private test clusters or
scale in or out resource groups to test at different scales.

Multi-protocol and high-concurrency performance tests

- Quickly define standard HTTP/HTTPS/TCP/UDP/HLS/RTMP/WebSocket/HTTP-
  FLV/MQTT packet contents. You can send pressure test traffic to different
  tested applications through simple adjustments.

  Define any fields in HTTP/HTTPS/TCP/UDP/HLS/RTMP/WebSocket/HTTP-FLV/
  MQTT packets based on the requirements of tested applications. For example,
  you can configure methods such as GET/POST/PATCH/PUT/DELETE, and URLs,
  headers, and bodies of HTTP requests.

- Define the behavior of virtual users for different test scenarios.

  Specify the interval for sending requests of the same user by setting the think
  time, or define multiple request packets in a transaction to set the number of
  requests initiated by each user per second.

- Customize the validation for the response result to make the checkpoint for
  successful requests more accurate.

  CodeArts PerfTest allows you to configure checkpoints based on your service
  requests. After obtaining response packets, CodeArts PerfTest verifies their
  response code, header and body fields. Only response packets that meet the
  specified conditions are considered normal responses.

Defining test task models for complex scenario tests

- You can test application performance by combining case scripts and pressure
  models for different high-concurrency scenarios.

- Test cases can be reused. You can define their pressure model and parameters
  such as the duration, number of concurrent users, number of flapping, and
  surge times, to simulate complex scenarios with traffic peaks and troughs.

Figure 1-2 Complex scenario tests
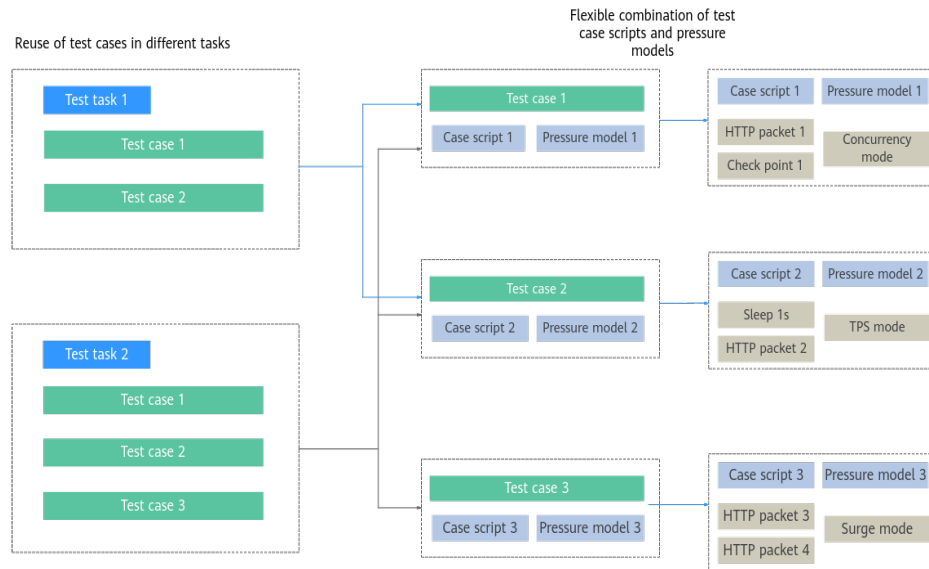
Providing professional performance test reports for easy understanding of application performance

- CodeArts PerfTest collects application performance statistics from multiple aspects, such as RPS, number of concurrent users, response latency, number of access requests, response verification failures, and response timeout.

- CodeArts PerfTest provides real-time and offline test reports for you to view and analyze test data at any time.

Managing private test clusters, isolating tenants' traffic, and providing on-demand use

- You can create test clusters as required to isolate the traffic between tenants and complete pressure tests of the internal network (Huawei Cloud VPCs) and external network. After tests are complete, you can delete clusters at any time.

- CodeArts PerfTest supports real-time scale-ins, scale-outs, and upgrades of test clusters.

2 Advantages

CodeArts PerfTest provides a one-stop performance test solution, helping you identify performance bottlenecks of applications in advance.

Cost-Efficient Simulation of Ultra-High Concurrency

- CodeArts PerfTest provides you with private test clusters. In such a test cluster, a single execution node can simulate tens of thousands of virtual users, and the entire test cluster can simulate tens of millions virtual users.

- CodeArts PerfTest is easy to use and greatly reduces test time. It simulates tens of millions instantaneous concurrent requests. In this way, you can identify application performance bottlenecks in high-concurrency scenarios and prevent system breakdown caused by a large number of access requests.

- CodeArts PerfTest supports execution of multiple concurrent tasks. It enables you to test the performance of multiple applications at the same time, greatly improving test efficiency.

Flexible and Fast Performance Testing, Achieving Quick Application Rollout

- Flexible protocol customization: HTTP/HTTPS tests are used to test the performance of various applications and microservice interfaces developed based on the HTTP/HTTPS protocol. TCP/UDP/WebSocket tests support the string and hexadecimal code stream modes, which meet the data construction requirements of various non-HTTP protocols. HLS/RTMP/HTTP-FLV/MQTT tests are supported.

- Flexible combination of multiple transaction elements and test task phases: CodeArts PerfTest provides flexible definition of data packets and transactions, as well as simulates scenarios where multiple users perform transaction operations during traffic peaks and troughs of test tasks. All of these features make CodeArts PerfTest ideal for complex scenario tests. In addition, CodeArts PerfTest allows you to specify the number of concurrent users for each transaction at each period and simulates instantaneous service traffic.

On-demand Use of Resources in Performance Tests

- Private resource group: You can create test clusters as required to isolate the traffic between tenants and complete pressure tests of the internal network (Huawei Cloud VPCs) and external network. After tests are complete, you can

delete clusters at any time. CodeArts PerfTest supports real-time scale-ins, scale-outs, and upgrades of test clusters.

- Shared resource group: Use shared resource groups for debugging or small scale concurrent pressure tests.

Quick Location of Performance Bottlenecks

- CodeArts PerfTest provides professional performance test reports to show metrics such as transaction concurrency, RPS, throughput, and response latency, metrics that worth attention in order to provide a pleasant use experience. CodeArts PerfTest provides real-time and offline reports, allowing for analysis of test data at any time.

- CodeArts PerfTest seamlessly interconnects with Application Performance Management (APM) and Application Operations Management (AOM). Using intelligent analysis, CodeArts PerfTest associates multiple monitored objects, and displays resource usage of applications, application tracing, and full-link topology. You can view the running statuses of applications in real time, and quickly locate performance bottlenecks.

3 Application Scenarios

CodeArts PerfTest provides distributed pressure tests and is widely used in various industries, such as the Internet, digital marketing, Internet of Vehicles (IoV), and finance.

E-Commerce Flash Sale Tests

E-commerce flash sales are characterized by large-scale user concurrency, multiple burst requests, and repeated access attempts. Guaranteeing the availability of websites under heavy load is key.

Advantages

- Scenario simulation: CodeArts PerfTest simulates tens of millions instantaneous concurrent requests to a website, and can simulate a heavy-load website in just one test model.

- Professional test report: CodeArts PerfTest provides statistics on the response latency range that accurately reflect user experiences.

- Retry for failed users: User-defined comparison of results calculated using expressions allows users who failed to log in to retry.

Figure 3-1 E-commerce flash sale tests
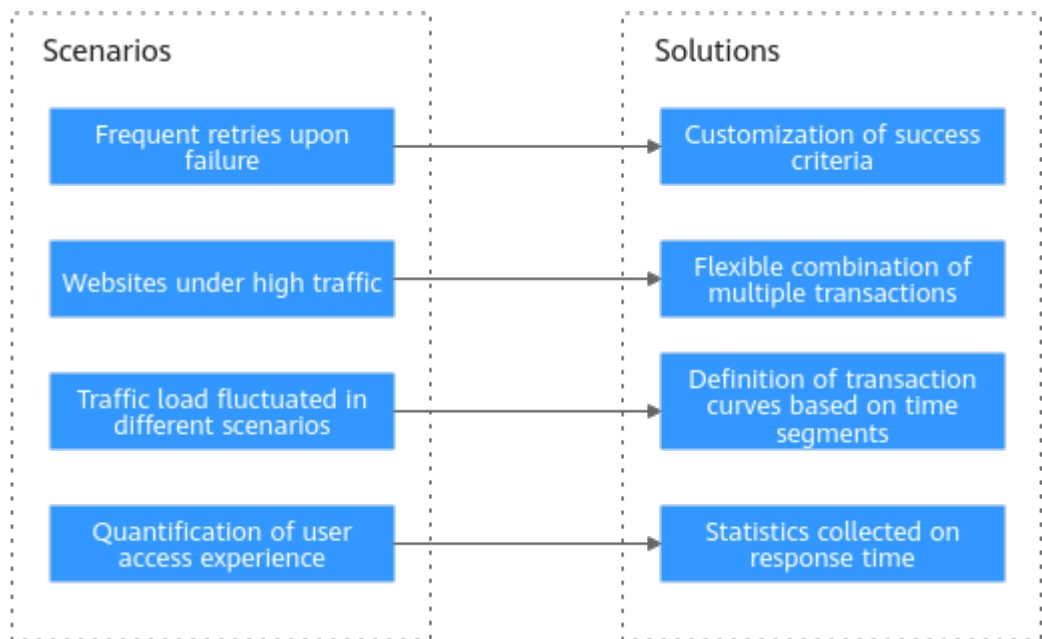
Game Peak Tests

Game services feature auto scaling in peak and off-peak scenarios. You can verify if auto scaling of games is normal, and if KPIs meet requirements in burst traffic scenarios.

Advantages

- Multi-scenario combination simulation: CodeArts PerfTest simulates real scenarios by combining multiple transactions, which include diverse elements, and customizing packets.

- Peak and off-peak scenario simulation: CodeArts PerfTest develops a pressure test curve for each transaction within a defined period to simulate peak and off-peak scenarios.

- KPI measurement: You can verify game KPIs in a peak scenario based on a customized response timeout interval.

Figure 3-2 Game peak tests
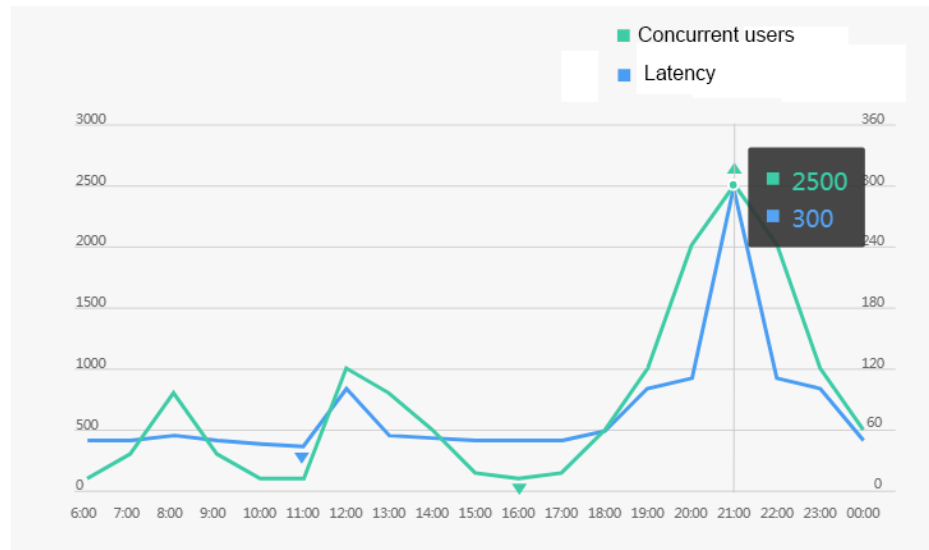
Complex Scenarios Support

CodeArts PerfTest simulates all the complexities of real traffic: A user's access may involve multiple HTTP requests; different users perform different transaction operations; user access fluctuates with transactions, displaying a sharp peak and off-peak trend; there may be instantaneous concurrent users. Performance tests must be performed on services to identify performance bottlenecks in advance.

Advantages

- Flexible model customization: CodeArts PerfTest supports multi-transaction tests in which multiple users perform multiple operations.

- Burst traffic: CodeArts PerfTest allows you to specify the number of concurrent users for each transaction at each period and simulates instantaneous service traffic.

- Result verification: Customized comparison of results calculated using expressions helps you customize transaction standards.

Figure 3-3 Complex scenarios support
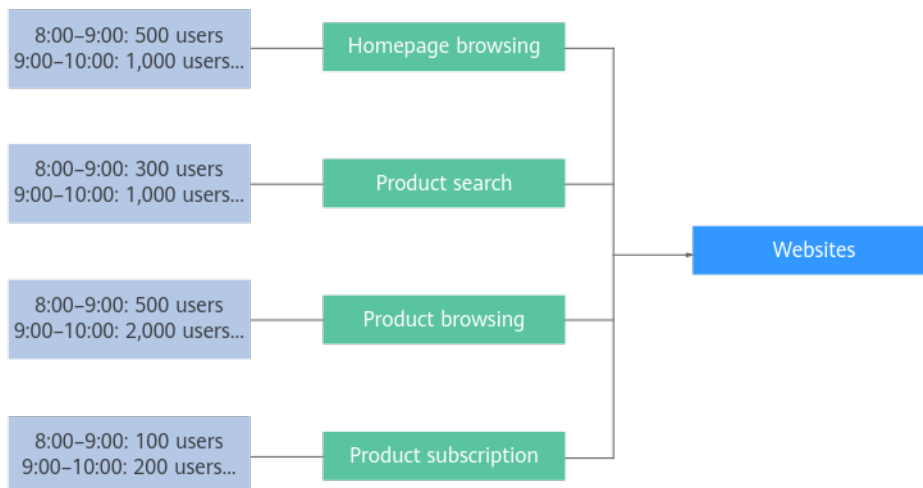
Application Performance Optimization

CodeArts PerfTest allows you to build performance test models, transmit simulated traffic to applications with CodeArts PerfTest executors, view resource monitoring and tracing status of applications, and monitor concurrent transaction processing capabilities to optimize the performance.

Advantages

- Flexible expansion: CodeArts PerfTest supports multiple performance tests and on-demand expansion of executor clusters.

- One-stop solution: CodeArts PerfTest can record and report concurrency capabilities, response latency, CPU or memory usage, and microservice processing latency.

- Pay-per-use: You are charged based on the duration of your performance test and the scale of concurrency.

4 Features

Pressure Test Engines for Tens of Millions of Concurrent Users, Ensuring Stability over Hundreds of Millions of Daily Active Users

With the rapid increase of enterprise services, some large-scale service systems now have hundreds of millions of daily active users, which presents significant challenges to live network stability. Identifying performance challenges brought by high-concurrency services in advance has become a key focus for enterprises.

CodeArts PerfTest supports ultra-high concurrency of tens of millions of clusters with ultra-high instantaneous concurrency, gradient pressure increase, and dynamic pressure adjustment, meeting pressure test requirements of applications with hundreds of millions of daily active users. It supports custom plug-ins to interconnect with proprietary protocols and functions, and meet the requirements of performance pressure tests based on various protocols and complex scenarios. Therefore, enterprises can conduct high-concurrency tests on demand to proactively identify performance issues and ensure the quality of their products before they hit the market.
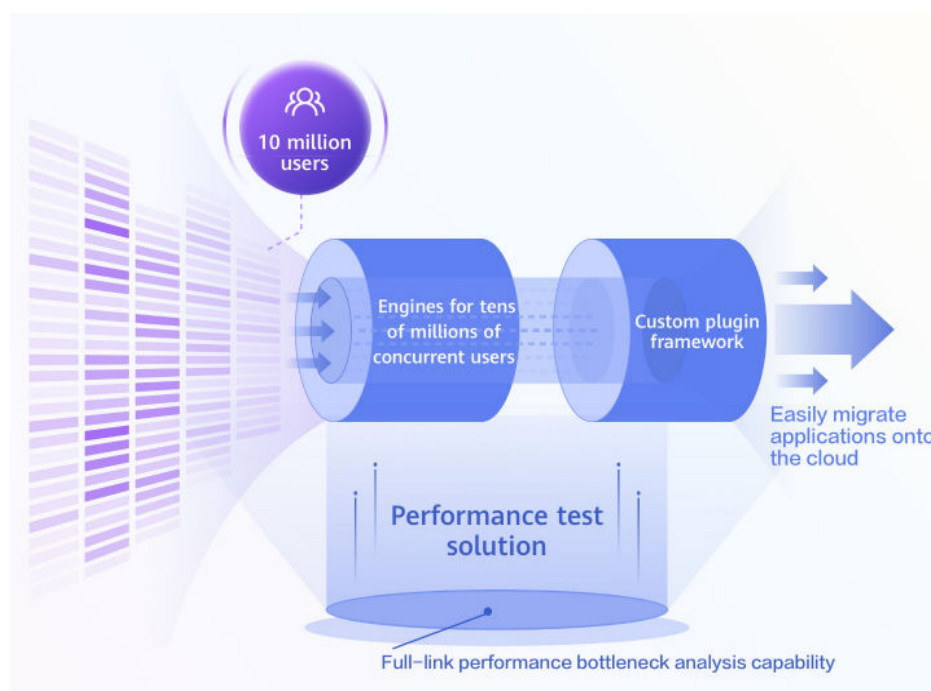
Eight Pressure Test Modes Cover All Scenarios for Smart Capacity Evaluation

Distilled from 30 years of high-concurrency test engineering solutions and practices, CodeArts PerfTest offers eight modes, such as surge (to simulate traffic bursts), intelligent peakload (to simulate system performance), oscillation (to simulate high and low peaks), and TPS mode (to customize pressure). You can create realistic scenarios quickly and increase the coverage of pressure test scenarios by 50%.
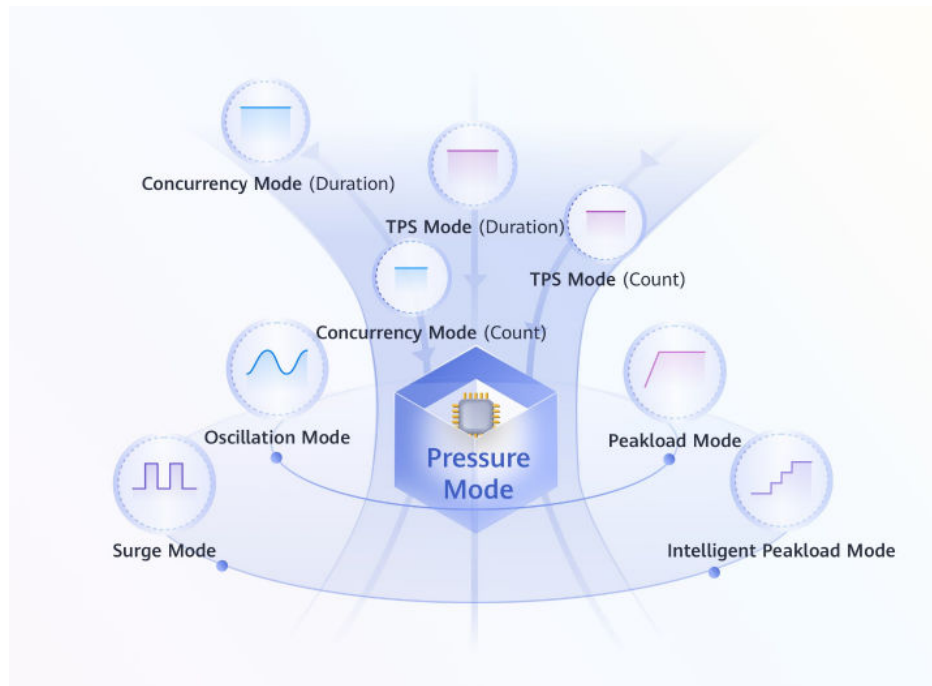
Zero-Cost Access of Existing Assets and Ready-to-Use Performance Pressure Tests

If you use JMeter to develop pressure test scripts, it may be a challenge to execute existing scripts efficiently. CodeArts PerfTest is compatible with JMeter scripts and their execution. By importing existing JMeter scripts into a JMeter project, you can easily conduct pressure tests and significantly reduce the time required to build a large-scale JMeter testing environment. This allows you to quickly expand your test capacity as needed, resulting in improved overall efficiency and the ability to complete pressure testing in a matter of hours instead of weeks.

Comprehensive Performance Evaluation, for Faster Diagnosis of Bottlenecks

CodeArts PerfTest provides comprehensive pressure test reports that cover multiple dimensions, including over 20 performance metrics such as TPS, RT, SuccessRate, TPxx, StatusCode, and execution logs. By analyzing real-time access resources and call chain relationships through visualized data, CodeArts PerfTest provides a thorough evaluation of performance metrics and compares multiple rounds of reports. This enables quick and accurate identification of performance bottlenecks, ensuring smooth service rollout.
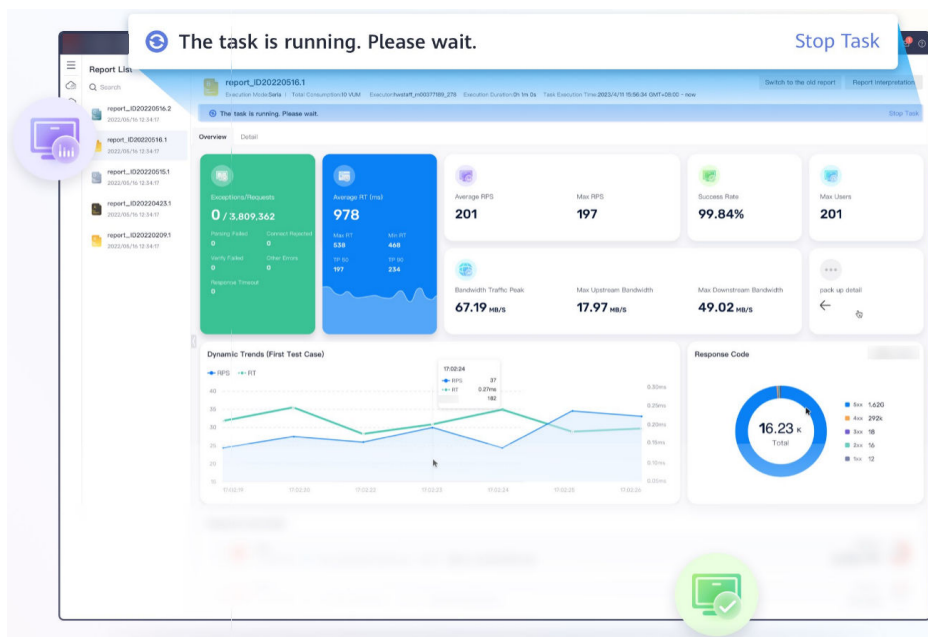
5 Notes and Constraints

Test Resource Groups and Their Constraints

- Test resource groups are classified into shared resource groups and private resource groups. Shared resource groups are provided by the system by default, and private resource groups need to be created.

- Execution nodes of the shared resource group have been bound with an elastic IP address (EIP). When the tested application has network access restrictions, use a private resource group.

- A shared resource group supports a maximum of 1,000 concurrent users and 100 Mbit/s bandwidth. If higher concurrency or bandwidth is required, use a private resource group.

- JMeter test tasks can use only private resource groups.

Suggestions on Using Nodes

- If an application is deployed on a node in a cluster, the node cannot be selected to create a private resource group. Do not run any applications or perform other functions on nodes used for test resource groups. Otherwise, applications may run abnormally.

- If you want to perform pressure tests on external services, bind an EIP to each execution node. If you want to debug external services, bind EIPs to both the debugging node and execution node. The test bandwidth is limited by the EIPs' bandwidth.

- Create at least two empty nodes. One is for debugging an execution node. The other is the execution node/executor (a target machine that a pressure test will be performed on and can provide performance data during testing). Create nodes of the required specifications based on the number of concurrent users for a pressure test. For details about the recommended node specifications, see **Table 5-1** and **Table 5-2**. These specifications are for reference only. Resource specification requirements for a pressure test are affected by think time, protocol type, the size and number of requests and responses, response time, and result verification. Adjust the specifications based on your requirements.

- In a PerfTest test project, one execution node with 8 vCPUs and 16 GB memory supports 10,000 concurrent users. In a JMeter test project, one execution node with 8 vCPUs and 16 GB memory supports 2,000 concurrent users.

Table 5-1 Recommended node specifications for PerfTest projects

Concurrent Users	Specifications	Quantity
0–5,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 4 vCPUs | 8 GB	1
5,001–10,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	1
10,001–20,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	2
20,001–30,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	3
30,001–40,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	4
40,001–50,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	5
More than 50,001	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	n

Table 5-2 Recommended node specifications for JMeter projects

Concurrent Users	Specifications	Quantity
0–1,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 4 vCPUs | 8 GB	1

Concurrent Users	Specifications	Quantity
1,001–2,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	1
2,001–4,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	2
4,001–6,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	3
6,001–8,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	4
8,001–10,000	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	5
More than 10,001	Debugging node: 4 vCPUs | 8 GB	1
	Execution node: 8 vCPUs | 16 GB	n

Quota Limits

Pay attention to the quota limits listed in **Table 5-3**.

Table 5-3 Quota limits

Parameter	Description	Default Value
Maximum number of concurrent users in a task	Restriction on the number of concurrent users in a task	1,000,000
Quota for the number of instance resource groups	Restriction on the number of instance resource groups	5

| Parameter	Description	Default Value
Quota for the number of project transactions	Restriction on the number of transactions in a project	100
Quota for the number of transaction elements	Restriction on the number of elements in a transaction	40
Quota for the number of projects	Restriction on the number of tenant projects	100
Quota for the number of tasks	Restriction on the number of tasks in a project	200
Quota for the number of tasks in a shared resource group	Restriction on the number of tasks in a shared resource group	1,000
Quota for the number of running tasks in a shared resource group	Restriction on the number of running tasks in a shared resource group	2
Quota for the running duration of a task in a shared resource group	Restriction on the running duration of a task in a shared resource group	3,600
Quota for the number of file variables	Restriction on the number of file variables	100

6 Security

6.1 Shared Responsibilities

Huawei guarantees that its commitment to cyber security will never be outweighed by the consideration of commercial interests. To cope with emerging cloud security challenges and pervasive cloud security threats and attacks, Huawei Cloud builds a comprehensive cloud service security assurance system for different regions and industries based on Huawei's unique software and hardware advantages, laws, regulations, industry standards, and security ecosystem.

Figure 6-1 illustrates the responsibilities shared by Huawei Cloud and users.

- **Huawei Cloud**: Ensure the security of cloud services and provide secure clouds. Huawei Cloud's security responsibilities include ensuring the security of our IaaS, PaaS, and SaaS services, as well as the physical environments of the Huawei Cloud data centers where our IaaS, PaaS, and SaaS services operate. Huawei Cloud is responsible for not only the security functions and performance of our infrastructure, cloud services, and technologies, but also for the overall cloud O&M security and, in the broader sense, the security and compliance of our infrastructure and services.

- **Tenant**: Use the cloud securely. Tenants of Huawei Cloud are responsible for the secure and effective management of the tenant-customized configurations of cloud services including IaaS, PaaS, and SaaS. This includes but is not limited to virtual networks, the OS of virtual machine hosts and guests, virtual firewalls, API Gateway, advanced security services, all types of cloud services, tenant data, identity accounts, and key management.

Huawei Cloud Security White Paper elaborates on the ideas and measures for building Huawei Cloud security, including cloud security strategies, the shared responsibility model, compliance and privacy, security organizations and personnel, infrastructure security, tenant service and security, engineering security, O&M security, and ecosystem security.

Figure 6-1 Huawei Cloud shared security responsibility model
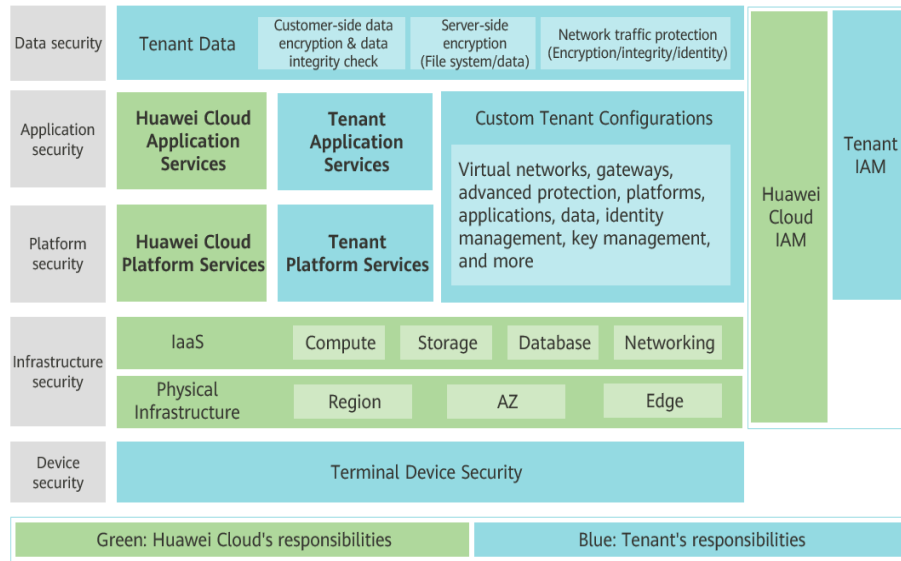
6.2 Identity Authentication and Access Control

- **Identity authentication**

  You can access CodeArts PerfTest through the console, APIs, or SDKs. All these access modes are implemented by sending requests via the REST APIs provided by CodeArts PerfTest.

  CodeArts PerfTest APIs can be accessed only after requests are authenticated. CodeArts PerfTest supports token authentication, that is, requests are authenticated using tokens.

  For details about authentication and authorization, see **Authentication**.

- **Access control**

  CodeArts PerfTest controls user operations in two ways.

  - Roles and permissions: Roles and permissions are required for adding, deleting, editing, and viewing CodeArts PerfTest test plans, test cases, test suites, test reports, and custom settings.

  - Fine-grained permissions: IAM fine-grained authorization is required for operations such as querying tenant projects, setting project creators, and managing tenant project members.

6.3 Data Protection

CodeArts PerfTest uses many methods to secure data.

Method	Description
Transmission encryption (HTTPS)	To ensure data transmission security, CodeArts PerfTest uses HTTPS for data transmission.

Method	Description
Personal data protection	CodeArts PerfTest controls access to data and records logs for operations performed on the data.
Privacy protection	CodeArts PerfTest does not use or store user data.
Data destruction	When you delete service data or deregister your account, non-key data is deleted physically in real time. Key data is marked as soft deleted and then physically deleted 10 minutes later.

6.4 Audit and Logs

- **Audit**

Cloud Trace Service (CTS) records operations on the cloud resources in your account. You can use the logs generated by CTS to perform security analysis, trace resource changes, audit compliance, and locate faults.

After you enable CTS and configure a tracker, CTS can record management and data traces of CodeArts PerfTest for auditing.

For details about how to enable and configure CTS, see **Enabling CTS**.

For details about CodeArts PerfTest operations that can be tracked by CTS, see **CodeArts PerfTest Operations That Can Be Recorded by CTS**.

- **Logs**

Log Tank Service (LTS) provides one-stop log collection, log search in seconds, massive log storage, log structuring, transfer and visualization. It can be applied to application O&M, visual analysis of network logs, graded protection compliance, and operation analysis.

To analyze problems, CodeArts PerfTest records system running logs to LTS in real time and stores the logs for three days.

6.5 Certificates

Compliance Certificates

Huawei Cloud services and platforms have obtained various security and compliance certifications from authoritative organizations, such as International Organization for Standardization (ISO). You can **download** them from the console.

Figure 6-2 Downloading compliance certificates

Resource Center

Huawei Cloud also provides the following resources to help users meet compliance requirements. For details, see **Resource Center**.

Figure 6-3 Resource center

7 Basic Concepts

Execution Node

An execution node is the target machine that a pressure test will be performed on and can provide performance data during testing.

Debugging Node

A debugging node is used to debug execution nodes.

Test Resources

Test resources refer to private resource groups.

CodeArts PerfTest Resources

CodeArts PerfTest resources refer to items such as test projects, directories, cases, and tasks.

Test Project

Test projects are classified into PerfTest projects and JMeter projects. PerfTest projects provide project management capabilities, allowing you to share and reuse the contents of transactions, pressure test tasks, and test reports within a test project, and create different test projects for different test programs. JMeter projects are used to import JMeter scripts to CodeArts PerfTest.

Transaction

A transaction is a user-defined operation model that consists of HTTP/HTTPS/TCP/UDP/WebSocket packet, think time, response extraction, checkpoint, and HLS/RTMP/HTTP-FLV/MQTT packet.

Packet

Packets are data blocks transmitted between applications such as HTTP. These data blocks start with text metadata that describes the packet content and meaning. The text metadata is followed by optional data. Packets are transmitted among clients, servers, and agents.

Think Time

To better simulate user behavior, insert a waiting time between different operations. For example, when a user receives data from the server, the user may wait several seconds before viewing data and providing responses. This period of time is called think time.

Response Extraction

If a transaction contains multiple packets, the output of the previous packet, which is extracted by a regular expression or JSON, is used as the input of the next packet.

Checkpoint

Checkpoints are where you define the verification information to determine whether the contents returned by the server are correct.

Test Task

A test task initiates a performance test based on a defined test model.

Test Report

When a test task is complete, a test report will be generated to present the test results.

Number of Concurrent Users

It refers to the number of users performing operations on a system at the same time. In CodeArts PerfTest, it is the number of virtual users you define when you configure a test phase.

RPS

Requests per second (RPS) indicates the number of requests per second. Average RPS = Total number of requests in a statistical period/Statistical period.

VUM

Virtual user minute (VUM) indicates the number of resources consumed by a task. The calculation formula is VUM = VU x M, in which VU indicates the number of concurrent virtual users and M indicates the pressure test duration, in minutes.

Bandwidth

Bandwidth records the real-time bandwidth usage during the running of the pressure test task. Uplink bandwidth refers to the speed at which the CodeArts PerfTest execution node sends out data. Downlink bandwidth refers to the speed at which the CodeArts PerfTest execution node receives data.

Response Time

Response time indicates the duration from the time when a client sends a request to the time when the client receives a response from the server.

Response Timeout

If the corresponding TCP connection does not return the response data within the set response timeout (5 seconds by default), the transaction request is considered a response timeout. Possible causes are: the tested server is busy, in crashes, or the network bandwidth is fully occupied.

Verification Failure

The response packet content and response code returned from the server do not meet the expectation (the default expected response code of HTTP/HTTPS is 200), such as code 404 or 502. A possible cause is that the tested service cannot be processed normally in scenarios with a large number of concurrent users. For example, a database bottleneck occurs in the distributed system or the backend application returns an error.

Resolution Failure

All response packets are received, but some packets are lost. As a result, the entire transaction response is incomplete. In this case, network packet loss may be the cause.

8 Permissions

If you need to grant your enterprise personnel permission to access your CodeArts PerfTest resources, use Identity and Access Management (IAM). IAM provides identity authentication, fine-grained permissions management, and access control. IAM helps you secure access to your cloud resources.

With IAM, you can create IAM users and grant them permission to access only specific resources. For example, if you want some software developers in your enterprise to be able to use CodeArts PerfTest resources but do not want them to be able to delete the resources or perform any other high-risk operations, you can create IAM users and grant permission to use the resources but not permission to delete them.

If your cloud account does not require individual IAM users for permissions management, you can skip this section.

IAM is a free service. You only pay for the resources in your account. For details, see **IAM Service Overview**.

CodeArts PerfTest Permissions

New IAM users do not have any permissions assigned by default. You need to first add them to one or more groups and then attach policies or roles to these groups. The users then inherit permissions from the groups and can perform specified operations on cloud services based on the permissions they have been assigned.

CodeArts PerfTest is a project-level service deployed for specific regions. To assign CodeArts PerfTest permissions to a user group, specify the scope as region-specific projects and select projects for the permissions to take effect. If **All projects** is selected, the permissions will take effect for the user group in all region-specific projects. When accessing CodeArts PerfTest, the users need to switch to the authorized region.

You can grant permissions by using roles and policies. Currently, only authorization by roles is supported in CodeArts PerfTest.

- Roles: A coarse-grained authorization strategy that defines permissions by job responsibility. Only a limited number of service-level roles are available for authorization. Cloud services often depend on each other. When you grant permissions using roles, you also need to attach any existing role

dependencies. Roles are not ideal for fine-grained authorization and least privilege access.

- Policies: A fine-grained authorization strategy that defines permissions required to perform operations on specific cloud resources under certain conditions. This type of authorization is more flexible and is ideal for least privilege access. For example, you can grant users only permission to manage a certain type of ECSs. A majority of fine-grained policies contain permissions for specific APIs.

Table 8-1 lists all the system-defined permissions for CodeArts PerfTest.

Table 8-1 System-defined permissions for CodeArts PerfTest

Role/Policy Name	Description	Type	Dependencies
CodeArts PerfTest Administrator	Users with these permissions can perform all operations on CodeArts PerfTest and test resources of the current tenant and all IAM users, such as adding, deleting, modifying, and querying resources.	System-defined role	To create, modify, or delete private resource groups, the **CCE Administrator** and **VPCEndpoint Administrator** permissions need to be assigned to users. If the user uses only the shared resource group to perform operations, no other permissions are required.
CodeArts PerfTest Developer	Users with these permissions can perform all operations, such as adding, deleting, modifying, and querying resources, only on a user's own CodeArts PerfTest and test resources.	System-defined role	To create, modify, or delete private resource groups, the **CCE Administrator** and **VPCEndpoint Administrator** permissions need to be assigned to users. If the user uses only the shared resource group to perform operations, no other permissions are required.

| Role/Policy Name	Description	Type	Dependencies
CodeArts PerfTest Operator	Users with these permissions can only read their own CodeArts PerfTest and test resources.	System-defined role	None.
CodeArts PerfTest Resource Administrator	Users with these permissions have all permissions related to test resources in CodeArts PerfTest.	System-defined role	This role must be used together with the **CodeArts PerfTest Developer** role, so that **CodeArts PerfTest Developer** can add, delete, modify, and query all private resource groups under the account.
CodeArts PerfTest Resource Developer	Users with these permissions can only view and use CodeArts PerfTest resources, but cannot create, update, or delete infrastructure resources.	System-defined role	This role must be used together with the **CodeArts PerfTest Developer** role, so that **CodeArts PerfTest Developer** can view and use all private resource groups under the account.

Notes and Constraints

- When an IAM user creates test resources for the first time, they must be authorized by the account. An agency is automatically created so that CodeArts PerfTest can perform operations on Cloud Container Engine (CCE).

- To use CodeArts PerfTest, you must have the **CodeArts PerfTest Administrator** or **CodeArts PerfTest Developer** permission (you can only view the projects you created).

- To manage private resource groups, you must have the **CodeArts PerfTest Administrator** permission or both **CodeArts PerfTest Developer** and **CodeArts PerfTest Resource Administrator** permissions.

- To use private resource groups, you must have the **CodeArts PerfTest Administrator** permission or both **CodeArts PerfTest Developer** and **CodeArts PerfTest Resource Developer** permissions.

- For details about the permissions required for using CodeArts PerfTest and their application scenarios, see **What Are the Permissions Required for Using CodeArts PerfTest?**.

9 Related Services

CodeArts PerfTest works with other cloud services to provide you with performance tests. **Figure 9-1** shows the relationship between them.

Figure 9-1 Relationship with other cloud services
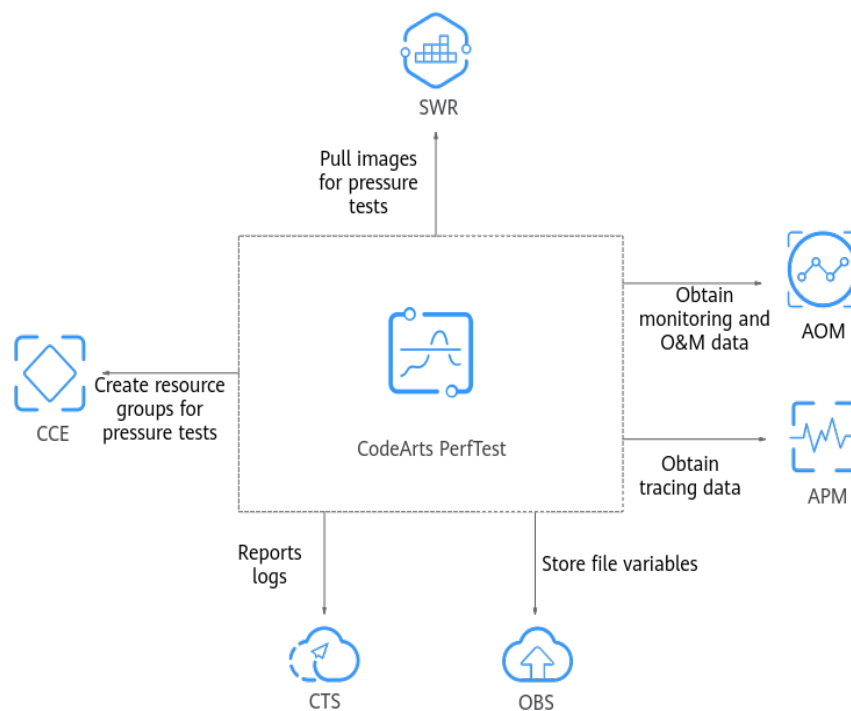
CCE

CCE provides highly scalable, high-performance, enterprise-class Kubernetes clusters and supports Docker containers. With CCE, you can easily deploy, manage, and scale containerized applications on Huawei Cloud.

CodeArts PerfTest uses CCE to create nodes that serve as the debugging and execution nodes in CodeArts PerfTest pressure test resource groups.

AOM

AOM is a one-stop, multi-dimensional O&M management platform for cloud applications. It monitors applications and related cloud resources in real time. AOM collects and associates resource metrics, logs, and events to analyze application health statuses, as well as provides flexible alarm reporting and data visualization. This helps you detect faults in a timely manner and monitor running statuses of applications, resources, and services in real time.

AOM monitors and centrally manages servers, storage devices, networks, web containers, and applications hosted in Docker and Kubernetes, effectively preventing problems, facilitating fault locating, and reducing O&M costs. In addition, AOM provides unified APIs for interconnecting self-developed monitoring or reporting systems. Unlike traditional monitoring systems, AOM monitors services by applications, meeting your requirements for high efficiency and fast iteration. It provides effective IT support for your services, and protects and optimizes your IT assets, enabling you to achieve strategic goals.

CodeArts PerfTest uses the resource monitoring provided by AOM, which is useful for intelligent analysis.

CTS

Cloud Trace Service (CTS) is a log audit service for cloud security. It allows you to collect, store, and query operation records of cloud resources for security analysis, compliance auditing, resource tracking, and fault locating.

CTS can record operations associated with CodeArts PerfTest for future query, audit, and backtracking.

APM

APM monitors and manages the performance of cloud applications in real time. APM provides performance analysis of distributed applications, helping O&M personnel quickly locate and resolve faults and performance bottlenecks.

APM is a cloud application diagnosis service with powerful analytic tools, supporting applications based on multiple Java frameworks. It displays the application statuses, call processes, and user operations through topologies, tracing, and transactions, allowing you to quickly locate performance bottlenecks.

APM and CodeArts PerfTest work together. APM provides call chain tracing and resource monitoring for pressure test applications deployed on APM. On the **Call Chain** page of APM, you can view the call chain information of applications. Red indicates abnormal, yellow indicates alarm, and green indicates normal.

OBS

Object Storage Service (OBS) is a secure, reliable, and cost-effective cloud storage service. With OBS, you can easily create, modify, and delete buckets, as well as upload, download, and delete objects.

The file variables of CodeArts PerfTest can be stored in OBS.

SWR

SoftWare Repository for Container (SWR) provides easy, secure, and reliable management over container images throughout their lifecycles, facilitating the deployment of containerized services.

For CodeArts PerfTest, SWR is used to obtain the images used for pressure tests in clusters.