Research and Practice on Performance Test of Call Center Platform System

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Abstract. Call center is more and more closely linked with people's daily life. This paper analyzes the three major problems of call center service (cask effect, avalanche effect, cumulative effect), introduces the call center platform performance testing strategy, and uses the Sprint and SilkPerformer testing tools to test the call center platform. The experimental results show that, through the implementation of performance testing, can predict the processing ability of the call center system in real environment, the system will advance the problems exposed, positioning help problem solution.

1. Introduction
Call center plays an important role in people's daily life. From Service Center of bank credit card, customer service call center of mobile operators, to travel booking system, customer service support of electronic and electrical products, all cannot do without the call center. the growth rate of call center is very rapid. With the development of network technology, database technology and object-oriented technology, call center system can meet the needs of more users, and can provide better service. For testing the performance of call center system, can calculate the specific load of call center system in traffic, long time call under the affordable, effective processing ability evaluation system, so as to ensure the stable operation of the system properly in the actual situation under the pressure.

2. Call Center System Business Analysis
The call center is a complicated information system, which consists of many modules such as switches, ACD (soft line or hard line), call control middleware (CTI), IVR, middleware, recording, sit, database etc. In the service mode of the call center, it is basically a serial structure. That is, the phone from the switch (or other access devices), through the control of ACD, to reach a service provider (IVR or sit). In service, any link problems can cause service failure.

In many cases, the system seems to work well. However, in some special environments, such as unexpected events, resulting in an increase in the amount of calls and lasted for a long period of time, the system performance will decline sharply, or even collapse. The reason for this phenomenon is that the performance of a link in the system is not enough to cope with the harsh environment, which leads to the decline of the service performance, and finally leads to the whole service chain breakdown. This is called "barrel effect". The overall performance of the system depends on the minimum performance.

Another potential problem is "avalanche effect" of the communication system, when the system's service capacity limit is reached, the service level is not maintained at the highest level of the system, it will be a sharp decline, and even lead to paralysis of the entire system. When faced with a complex call center system, it is unable to determine whether there is an "avalanche effect" and the worst performance link from the technical proposal and demonstration system. In particular, the call control
platform of many call center systems is closely linked with the service system, and the performance bottleneck of the system may also reduce the performance of the call control platform.

In addition, before the system is opened, it is difficult to judge whether the increase of data will lead to the decline of system performance after a period of time. This is called “Cumulative effect”.

To solve the above three effects (barrel effect, avalanche effect, cumulative effect), to ensure that multiple modules provided by different manufacturers can be very closely integrated into a complete system, the most effective way is through the call generator (CGS) analog initiated user call pressure to evaluate the system in the harsh environment.

3. Call Center System Architecture
The measured call center system is supported by information technology, optimizes and integrates existing resources, conducts intensive management on the telephone, foreign service website, email, fax, SMS (MMS) and other non-contact customer service platform. It focuses on the admissibility of customer service consulting, fault repair, report complaints, and realizes the whole process of the closed-loop management business.

The logical structure of the call center platform system is shown in figure 1.

![Figure 1. The logical structure of the call center platform system.](image)

4. Test Design
The call center system test covers the core business such as large user incoming call efficiency test, soft phone interface test, IVR voice query and user verification test.

Incoming call efficiency test: Using Sprint Abacus5000 as call generator to simulate PSTN network and the caller’s operation to generate no less than 100 thousand call per hour. Using two call generator, each connected a gateway. Two links of one gateway carry 240 incoming call. One link of another gateway carry 120 incoming call, another link connecting to PSTN network is used for manually dial. The total incoming call is 360. Open a new channel in the gateway temporarily, connecting the operator small transmitter (PSTN network). Prepare 30 IP phones and 30 computers (install soft phone plug in), and check in the seat number on the soft phone before testing.

The test architecture is shown in figure 2.
Figure 2. The test architecture.

Soft phone interface test, IVR voice query and user verification test: The performance test tool Silk Performer is used to simulate the multi-user concurrent operation to obtain the processing ability and response of the call center system.

5. Test Strategy

5.1. Incoming Call Efficiency Test
Test access from two gateways, one gateway carries 240 concurrent incoming test, and another gateway carries 120 concurrent incoming test. The aim of the test is to check whether the system can carry 100 thousand calls per hour. Test coverage voice gateway, SIP services, CTI services, IVR services, business system Web interface.

During the test, the testers simulate call to artificial service, call to electricity inquiry, call to policy query and other business scenarios. The test is divided into single point operation performance test, mixed business performance test and stability test. Single point performance testing and performance testing of mixed business last 1 hours, stability test last 15 hours.

5.2. Soft phone Interface Test
Perform multi-user concurrent performance testing using SilkPerformer to check the function of the soft phone, such as set the idle, busy, check out, etc.

During the test, 10 and 20 and 30 seat users are simulated to do operation such as check-in, check-out, setting busy and setting idle. The test is divided into single point operation performance test, stability test. The single point operation performance test duration is 5 minutes; the stability of the test duration is 1 hours.

5.3. IVR Voice Query and User Verification Test
Perform multi-user concurrent performance testing using SilkPerformer to check the function of IVR voice query and user verification test.
During the test, 100 and 200 and 300 users are simulated to do operation such as user verification, bill query, history bill query. The test is divided into single point operation performance test, stability test. The single point operation performance test duration is 5 minutes; the stability of the test duration is 1 hours.

6. Test Result
The system can bear 100 thousand calls per hour, and the success rate is about 99.90%. During the test, each server CPU occupied less than 10%. The TTS server occurs abnormal fluctuations in memory when mixed business performance test, the rest of the servers are normal in memory.

The response time of soft phone interface in 10, 20, 30 concurrent users is less than one second, the response time of IVR voice query interface in 100, 200, 300 concurrent users is less than 1 second. During the test, the server CPU occupied less than 10%, no abnormal fluctuations in available memory.

Incoming call efficiency stability test gateway monitoring figure shown in Figure 3:

![Gateway monitoring](image)

Figure 3. Gateway monitoring.

7. Test Significance
Through the test, evaluate the performance of the call center objectively, provide decision-making basis for the construction of call center system. Through the measurement of performance parameters in a certain number, construct management visibility of call center. Analyze the performance defects of the call center by simulating pressure tests. Analysis the test results and gets the report. The report pointed out that the need to improve, and improve the operation efficiency of the call center, improve the service quality of the enterprise; further help enterprises to improve the level of management, improve customer satisfaction.

8. Acknowledgments
This work was supported by the Shanghai science and Technology Fund Project (No: 15511107003), National Natural Science Foundation of China (No: 61502299), Shanghai science and Technology
Fund Project (No: 16511101202).

9. References
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