**DELTA**

*Project Name : CPM 2.0.2*

***MQTT******Performance Test Plan***

***Revision History***

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author | Note |
| 1.0 | 10/18/2016 | Hongtu.Yan  &Xiaojia.Yang | This plan is for PVT benchmark test on MQTT |

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# Introduction

MQTT is a core module for CPM structure but we need to test on MQTT’s performance separately in the first step. After the performance of mosquito MQTT, we have completely acquired how much various indicators influence the performance of MQTT and what the performance is.

Next, we need to bring MQTT in the complete CPM structure and then to check its efficiency in order to build a proper foundation of performance. In addition, we can also be aware of the performance of CPM in a degree.

# Testing Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| *Testing Phase* | *Start Time* | *End Time* | *Member* |
| *Benchmark/Load testing* | *?* | *?* | *Hongtu.Yan& Xiaojia.Yang* |
| *Volume/Stress testing* | *?* | *?* | *Hongtu.Yan& Xiaojia.Yang* |

# Testing Resources

## Software Environment

|  |  |  |
| --- | --- | --- |
| *Software Name* | *Version* | *Specification* |
| *Linux(By VMware)* | *Ubuntu 11.04-64bit* | *1. It is used for deploying MQTT sever and the monitoring tool;*  *2. Adopt distributed environments* |
| *MongoDB* | *1.8.2* | *Use linux version not windows* |
| *JDK* | *IBM 1.7* | *JDK must be IBM’s* |

## Hardware Environment

|  |  |  |
| --- | --- | --- |
| *Hardware Name* | *Configuration* | *Specification* |
| *CPU* | *1.Core : Double cores*  *2.The main frequency:2.6GHz* | *This is a normal configuration level* |
| *Ethernet Bandwidth* | *100Mbps(Wired)* | *This is a normal configuration level* |
| *Physical Memory* | *4 GB DDR3* | *This is a normal configuration level* |
| *Disk* | *1.Size: 20 GB;*  *2.Rotate speed:5000r/s* | *This is a basic configuration level* |

## Tools

|  |  |  |
| --- | --- | --- |
| *Tool Name* | *Version* | *Specification* |
| *RTC* | *2.0* | *This is for code development such as testing code* |
| *NMon* | *11.0* | *This is a monitoring tool running on linux system* |
| *VMware* | *12-PRO* | *This tool is used for build virtual linux system* |

## Personnel Assign

|  |  |
| --- | --- |
| *Members* | *Duty* |
| *Test Leader* | *Review PT Plan* |
| *QA* | *Review PT plan and execute, analyze* |
| *PM* | *Audit testing results/analysis* |

# Object and Thought for Testing

## Testing Objective

* Through benchmark testing, make sure which factors would influence MQTT’s performance
* To build a baseline that can guide load/stress testing afterwards
* Find the bottleneck out
* Verify stability of the system

## Testing Object Analysis

Before designing PT test scenarios, I summarize the factors that would influence CPM /MQTT performance in the process of publishing/subscribing messages:

* Connection number: Includes subscriber and publisher number
* Message size
* Message type(Essentially, this factor lays a Less influence on the performance)
* The proportion between aggregator and EP
* Data aggregating or sending frequency
* Topic number
* Message number
* Message number for one topic
* If importing EP, then we should remind What kind of reverse control and EP processes which topic
* The communication methods of MQTT

*QoS0🡪QoS2*

No matter how environment or scenarios changes, these system attributes that can influence performance would never change.

# Scenarios Design

## 5.1. Subscriber and Publisher Simulation

### 5.1.1. Multiple publishers to one subscriber

*Change number of connection*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Message Number* | *Message Period* | *Message Size* | *Topic Number* |
| *500* | *100* | *1 s* | *1 kb* | *1* |
| *1000* | *100* | *1 s* | *1 kb* | *1* |
| *1500* | *100* | *1 s* | *1 kb* | *1* |
| *2000* | *100* | *1 s* | *1 kb* | *1* |

*Change proportion of connection number*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Message Number* | *Message Period* | *Message Sizes* | *Topic Number* |
| *1000 (90%,10%)* | *100* | *1 s* | *1 kb* | *#Sub* |
| *1000 (80%,20%)* | *100* | *1 s* | *1 kb* | *#Sub* |
| *1000 (70%,30%)* | *100* | *1 s* | *1 kb* | *#Sub* |
| *1000 (60%,40%)* | *100* | *1 s* | *1 kb* | *#Sub* |
| *1000 (50%,50%)* | *100* | *1 s* | *1 kb* | *#Sub* |

### 5.1.2. Multiple publisher to Multiple subscribers

*Change number of connection*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Message Number* | *Message Period* | *Message Size* | *Topic Number* |
| *1000* | *100* | *1 s* | *1 kb* | *500* |
| *2000* | *100* | *1 s* | *1 kb* | *1000* |
| *3000* | *100* | *1 s* | *1 kb* | *1500* |
| *4000* | *100* | *1 s* | *1 kb* | *2000* |
| *5000* | *100* | *1 s* | *1 kb* | *2500* |
| *6000* | *100* | *1 s* | *1 kb* | *3000* |
| *8000* | *100* | *1 s* | *1 kb* | *4000* |

*Note: Ensure that the proportion of sub and pub is 1:1.*

*Change period*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Period* | *Message Sizes* | *Message Number* | *Topic Name* |
| *3000/5000* | *1 s* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *100ms* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *10ms* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *1ms* | *1k* | *100* | *#Task Number* |

* Change message size

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Period* | *Message Sizes* | *Message Number* | *Topic Number* |
| *3000/5000* | *1s* | *64K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *16K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *128K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *1k* | *100* | *#Task Number* |

## 5.2. Other CPM Components Addition

In this area, we test on the performance of MQTT with aggregator and eventProcessor. Although importing CPM components, the notion is the same.

Equivalence relationship:

* Sensor number: Publisher number
* Task number: Subscriber number
* The sum amount of sensor number and task number is representative for connection number

*Note:*

* *In addition to subscribing message from MQTT, EP can do reverse control as well;*
* *Assuming that EP would tackle with all topics*

The detailed scenarios are shown below:

### 5.2.1. Multiple sensors to Single Task

*Change number of connection*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Message Number* | *Message Period* | *Message Size* | *Topic Number* |
| *500* | *100* | *1 s* | *1 kb* | *1* |
| *1000* | *100* | *1 s* | *1 kb* | *1* |
| *1500* | *100* | *1 s* | *1 kb* | *1* |
| *2000* | *100* | *1 s* | *1 kb* | *1* |

*Note: It can also help testers acknowledge whether or not a large number of messages beneath single topic will reduce the performance of MQTT.*

### 5.2.2. Multiple sensors to Multiple Tasks

*Change number of connection*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Message Number* | *Message Period* | *Message Size* | *Topic Number* |
| *1000* | *100* | *1 s* | *1 kb* | *500* |
| *2000* | *100* | *1 s* | *1 kb* | *1000* |
| *3000* | *100* | *1 s* | *1 kb* | *1500* |
| *4000* | *100* | *1 s* | *1 kb* | *2000* |
| *5000* | *100* | *1 s* | *1 kb* | *2500* |
| *6000* | *100* | *1 s* | *1 kb* | *3000* |
| *8000* | *100* | *1 s* | *1 kb* | *4000* |

*Change message size*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Period* | *Message Sizes* | *Message Number* | *Topic Number* |
| *3000/5000* | *1s* | *64K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *16K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *128K* | *100* | *#Task Number* |
| *3000/5000* | *1s* | *1k* | *100* | *#Task Number* |

*Change message sending period of sensors*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Connection* | *Period* | *Message Sizes* | *Message Number* | *Topic Name* |
| *3000/5000* | *1 s* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *100ms* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *10ms* | *1k* | *100* | *#Task Number* |
| *3000/5000* | *1ms* | *1k* | *100* | *#Task Number* |