ZK vs. Ajax JSF
Performance Report

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Introduction

To determine the performance and scalability of server-centric RIA framework, we choose 2 frameworks, 4 targets, including ZK 6.0.1 CE, ZK 6.0.1 EE and PrimeFaces with 2 different settings, and we arrange a test, grid containing 2000 records. We use JMeter to record the average response time, and VisualVM to record the memory consumption of each test case.

Test Environment

The following paragraph includes the hardware spec of this test, required software, and corresponding parameters.

- **Hardware**
  - CPU: AMD Athlon II X4 635 Processor @2.90 GHz
  - Memory: 8.00 GB
- **Software**
  - ZK 6.0.1 CE
  - ZK 6.0.1 EE
  - PrimeFaces 3.2 with settings S/C/R
  - PrimeFaces 3.2 with settings S/S/S
  - JDK 1.6.0.32
  - JBOSS 6
  - JMeter 2.6
  - Visual VM

- **PrimeFaces settings**
  - **S/S/S**

```
S/S/S:
in web.xml
<context-param>
    <param-name>javax.faces.PARTIAL_STATE_SAVING</param-name>
    <param-value>true</param-value>
</context-param>
<context-param>
    <param-name>javax.faces.STATE_SAVING_METHOD</param-name>
    <param-value>server</param-value>
</context-param>

in faces-config.xml
<managed-bean>
    <managed-bean-name>sodetailController</managed-bean-name>
    <managed-bean-class>com.test.jsf.SodetailController</managed-bean-class>
    <managed-bean-scope>session</managed-bean-scope>
</managed-bean>
```

- **S/C/R**

```
S/C/R:
in web.xml
<context-param>
    <param-name>javax.faces.PARTIAL_STATE_SAVING</param-name>
    <param-value>true</param-value>
</context-param>
<context-param>
    <param-name>javax.faces.STATE_SAVING_METHOD</param-name>
    <param-value>client</param-value>
</context-param>

in faces-config.xml
<managed-bean>
    <managed-bean-name>sodetailController</managed-bean-name>
    <managed-bean-class>com.test.jsf.SodetailController</managed-bean-class>
    <managed-bean-scope>request</managed-bean-scope>
</managed-bean>
```

- **Configurations**
    - JBOSS 6
        - Session time-out: default
        - -Xms 2048MB
        - -Xmx 2048MB
        - -XX:PermSize 1024MB
        - -XX:MaxPermSize 1024MB
        - maxThreads: 2000
        - acceptCount: 1024
    - JMeter
        - 100, 200, ..., 1000 concurrent threads in 1 second

Test Plan

The test case is a Grid containing 10 columns x 2000 rows of data where three of the columns are text input fields and seven of the columns are display labels. Testing is done by loading page once (direct link to page) followed by sending two ROD requests (by scrolling page several times).

- Target
  ZK 6.0.1 CE, ZK 6.0.1 EE, PrimeFaces S/S/S, PrimeFaces S/C/R (for the details of PrimeFaces' settings, please refer to the Test Environment section.)
- Test action
  Deploy only one war file at a time, restart JBOSS 6 server and load page once before each test (for preloading the static data)

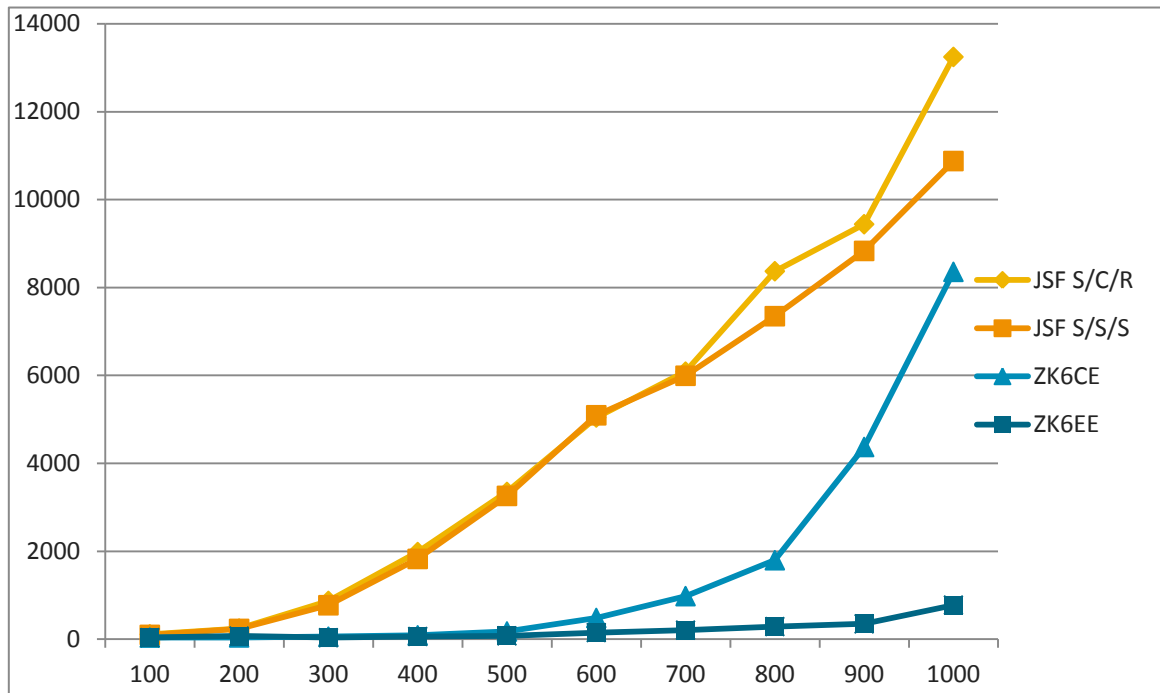# Test Case – Grid with 2000 records, ROD twice

- Test Case Screen shot

ZK

PrimeFaces

- ## Response Time (The lower the better)

- PrimeFaces SCR
  - 500 concurrent threads: more than 3.35 seconds response time
  - 1000 concurrent thread: More than 13.24 seconds response time
- PrimeFaces SSS
  - 500 concurrent threads: more than 3.26 seconds response time
  - 1000 concurrent thread: more than 10.88 seconds response time
- ZK 6.0.1 CE
  - 500 concurrent threads: less than 0.17 second response time
  - 1000 concurrent threads: less than 8.36 second response time
- ZK 6.0.1 EE
  - 500 concurrent threads: less than 0.08 second response time
  - 1000 concurrent threads: less than 0.78 second response time

- ## Memory Consumption (The lower the better)
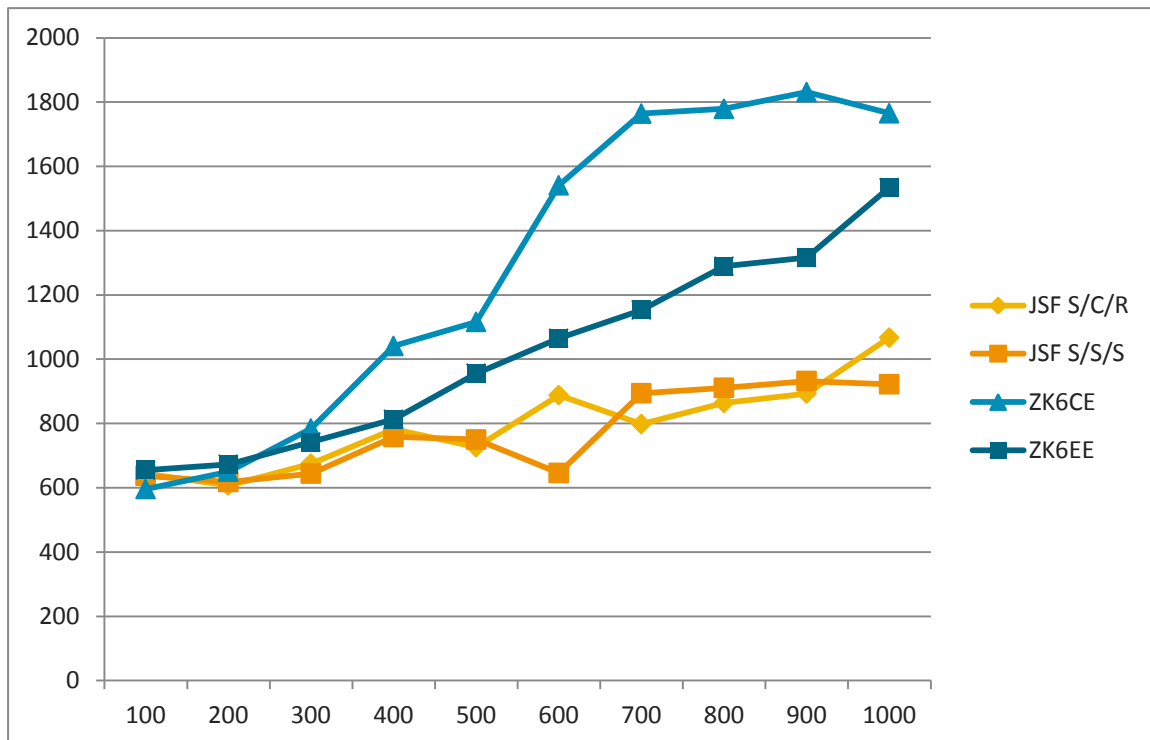
- PrimeFaces SCR
    - 500 concurrent threads: 726 MB memory consumption
    - 1000 concurrent threads: 1067 MB memory consumption
- PrimeFaces SSS
    - 500 concurrent threads: 750 MB memory consumption
    - 1000 concurrent threads : 922 MB memory consumption
- ZK 6.0.1 CE
    - 500 concurrent threads: 1116 MB memory consumption
    - 1000 concurrent threads: 1765 MB memory consumption
- ZK 6.0.1 EE
    - 500 concurrent threads: 956 MB memory consumption
    - 1000 concurrent threads: 1534 MB memory consumption

Summary

ZK performance is much faster than PrimeFaces in terms of average server response time for both CE and EE. ZK EE in particular is approximately 14 and 42 times faster than that of PrimeFaces S/S/S for 1000 and 500 concurrent users respectively. Regarding memory consumption, ZK uses slightly more memory than PrimeFaces by approximately 1.2-1.6 times.

Appendices

- Raw data

PrimeSCR	#Samples	Average	Median	90% Line	Min	Max	Error%	Throughput	KB/sec	Memory
100	300	111	125	172	12	356	0.00%	11.8/sec	281.5	644
200	600	242	131	685	11	1458	0.00%	20.9/sec	499.3	607
300	900	872	222	3142	10	5957	0.00%	28.3/sec	675.7	675
400	1200	1983	406	6865	10	11367	0.00%	33.1/sec	790.6	782
500	1500	3351	929	10927	10	18284	0.00%	37.1/sec	885.1	726
600	1800	5045	1125	18354	10	28993	0.00%	36.1/sec	861.8	888
700	2100	6087	1354	19167	10	32920	0.00%	37.6/sec	898.4	798
800	2400	8372	1999	27991	10	38589	0.00%	36.8/sec	879.7	864
900	2700	9441	3712	29588	10	44673	0.00%	41.4/sec	988.6	893
1000	3000	13247	8859	32805	10	51476	0.00%	37.4/sec	892.8	1067
PrimeSSS	#Samples	Average	Median	90% Line	Min	Max	Error%	Throughput	KB/sec	Memory
100	300	99	118	155	11	254	0.00%	11.8/sec	261	637
200	600	235	128	643	10	2130	0.00%	21.7/sec	479.9	618
300	900	774	178	2894	10	5351	0.00%	30.5/sec	674.7	644
400	1200	1827	288	6865	9	11799	0.00%	33.7/sec	746.8	758
500	1500	3261	654	11485	10	16839	0.00%	36.2/sec	801.4	750
600	1800	5095	916	16804	9	22916	0.00%	35.3/sec	782.6	646
700	2100	5994	1284	20190	10	31881	0.00%	37.8/sec	837.1	894
800	2400	7349	2003	24512	9	34314	0.00%	39.4/sec	872.3	911
900	2700	8834	2240	29744	9	43487	0.00%	42.0/sec	929.9	932
1000	3000	10878	3978	34888	9	47935	0.00%	38.7/sec	857.9	922

ZK601CE	#Samples	Average	Median	90% Line	Min	Max	Error%	Throughput	KB/sec	Memory
100	400	38	5	78	2	974	0.00%	11.2/sec	58.2	596
200	800	42	5	82	2	1356	0.00%	22.5/sec	117.1	650
300	1200	58	5	99	2	1720	0.00%	31.1/sec	162	784
400	1600	89	4	224	2	2465	0.00%	44.7/sec	233	1041
500	2000	177	5	733	2	3312	0.00%	55.1/sec	287.1	1116
600	2400	485	5	2051	2	6963	0.00%	66.7/sec	347.8	1541
700	2800	981	5	4048	2	10216	0.00%	71.5/sec	372.6	1764
800	3200	1798	31	6379	1	17028	0.00%	69.8/sec	363.5	1779
900	3600	4374	3172	10999	1	22155	0.00%	63.0/sec	328.2	1831
1000	4000	8358	3264	29243	1	41431	0.00%	56.2/sec	292.8	1765
ZK601EE	#Samples	Average	Median	90% Line	Min	Max	Error%	Throughput	KB/sec	Memory
100	400	38	24	51	2	851	0.00%	12.2/sec	36.2	655
200	800	72	21	69	2	2147	0.00%	23.5/sec	69.8	673
300	1200	36	19	51	1	1403	0.00%	35.4/sec	105.3	742
400	1600	64	17	64	1	2796	0.00%	43.7/sec	129.8	813
500	2000	78	17	81	1	2600	0.00%	53.2/sec	158.3	956
600	2400	152	17	234	1	3437	0.00%	64.4/sec	191.4	1065
700	2800	208	17	585	1	4519	0.00%	77.5/sec	230.4	1153
800	3200	289	18	981	1	5534	0.00%	79.9/sec	237.5	1289
900	3600	351	20	1460	1	3933	0.00%	93.6/sec	278.3	1316
1000	4000	778	24	3185	1	6923	0.00%	107.5/sec	319.4	1534