

# 애플리케이션 성능과 장애 대응 데모

- 목적

- 어플리케이션을 실시간 모니터링 데모를 통하여 장애 발생 시 원인을 정확히 파악하기 위함입니다.

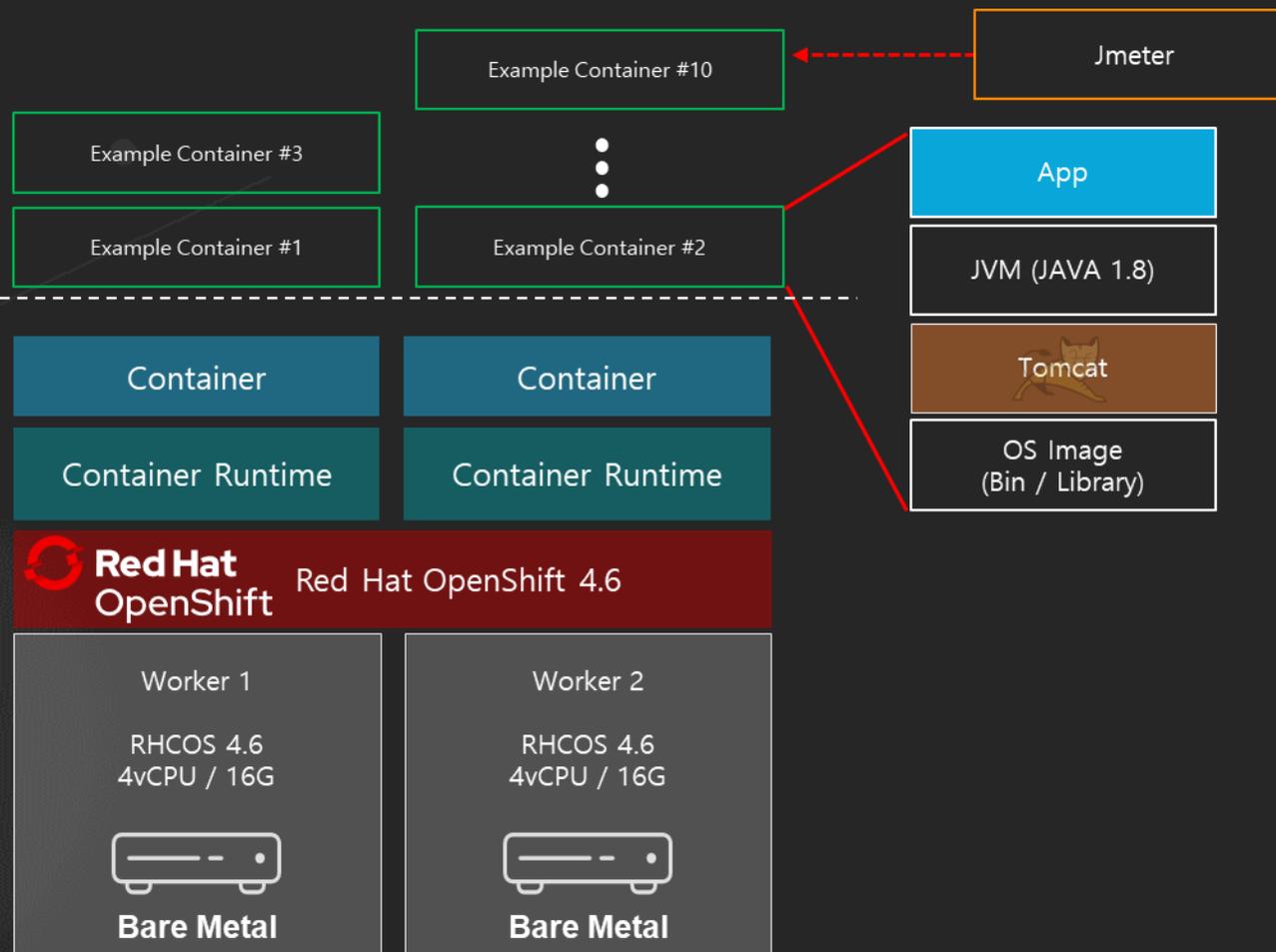
- 내용

- 장애가 시 OPENMARU APM에서 장애 발생 원인을 정확히 확인 할 수 있습니다.
- CPU에 부하를 주는 샘플 어플리케이션을 배포한 후 JMeter 로 부하를 줘서 APM에서 헬스체크, 이벤트 목록에서 장애 내역을 확인 할 수 있습니다.



어플리케이션 장애 타입이 따로 있는건가요?  
그런걸 APM 통해서 알면 어떤 대응을 할 수 있나요?

# Container 환경 테스트 구성도



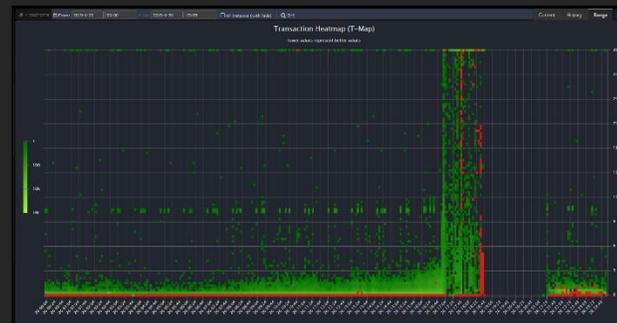
PaaS 운영

# 애플리케이션 장애의 대표적인 패턴

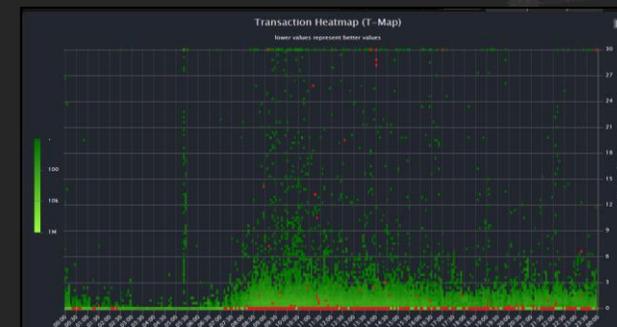
# 애플리케이션 장애의 대표적인 패턴



**Full GC**




**Server Hang**




**Runtime Exception**



# Full GC

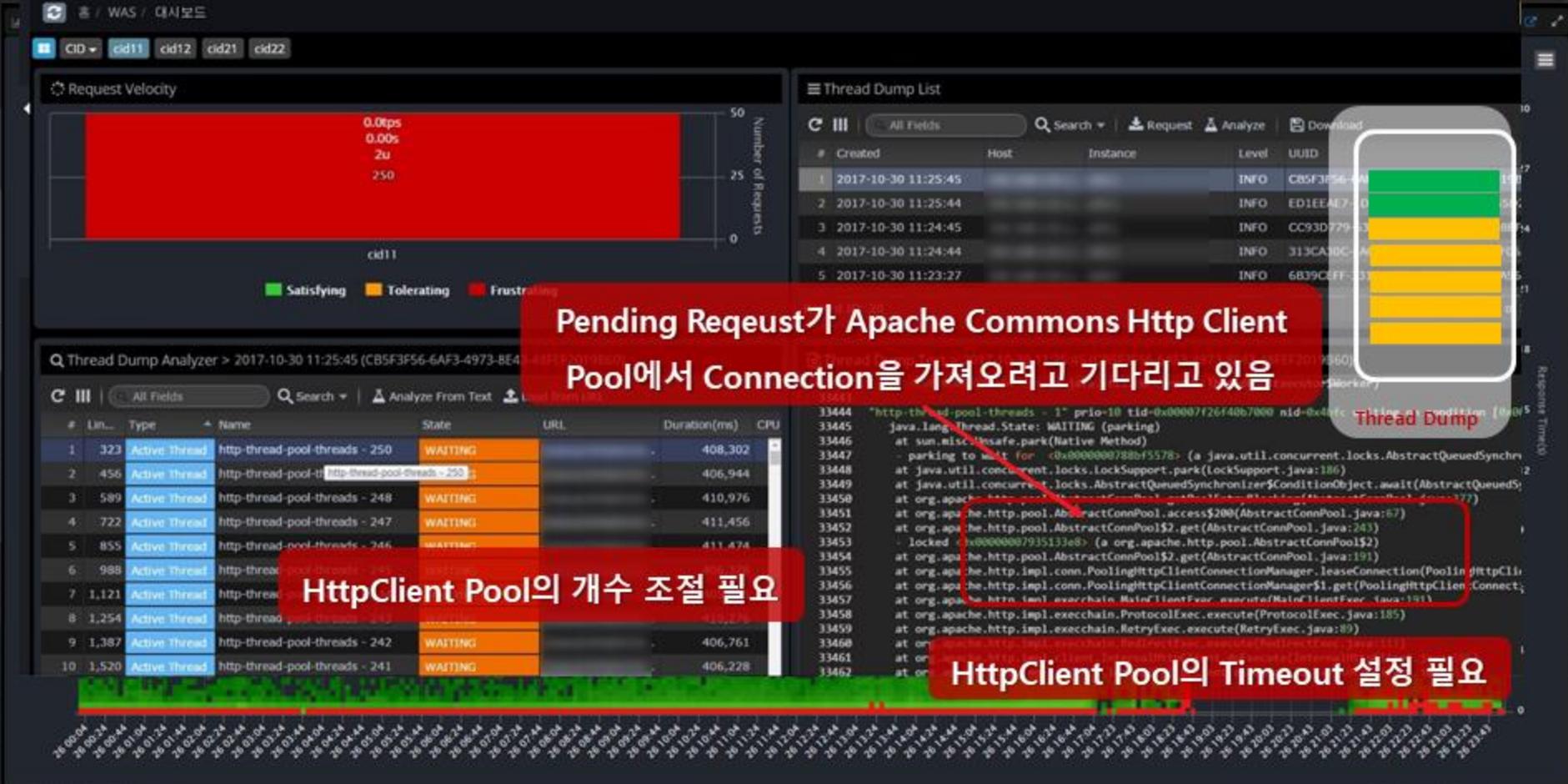


Agent Type	Server IP	Client IP	Instance ID	URL	Status	Duration(ms)	SQL Time(ms)	Fetch Gab	Fetch Count	External Time	CPU Time(ms)	Start Time
WAS				/member/auth	500	178,684	93	178,543	92,982	0	3,203.13	2017-12-11 18:30:47.754
WAS				/member/auth	200	146,325	9,265	0	2	0	31.25	2017-12-11 18:31:19.925
WAS				/member/auth	200	143,590	0	0	2	0	31.25	2017-12-11 18:31:22.660
WAS				/log/tracking	200	134,481	0	0	0	0	15.63	2017-12-11 18:31:31.785
WAS				/log/tracking	200	129,779	0	0	0	0	46.88	2017-12-11 18:31:36.503
WAS				/member/auth	200	127,184	4,093	0	1	0	46.88	2017-12-11 18:31:39.066
WAS				/member/auth	200	127,184	4,093	0	1	0	31.25	2017-12-11 18:31:41.691
WAS				/member/firstAct	200	119,107	0	0	1	0	78.13	2017-12-11 18:31:47.128

사용자 인증시 데이터베이스 Fetch를 92,982건 호출함

Name	Value	Name	Value
Request URL	POST /member/auth <a href="#">View URL</a>	Params	
Request Host	o.kr <a href="#">View Page</a>	Status Code	500
Client IP	User Location	User Agent	Variables/2.0.7 (iPhone; iOS 10.3.2; Scale/3.00)
Start Time	2017-12-11 09:30:47.754	End Time	2017-12-11 09:33:46.438
Duration (ms)	178,684	CPU Time (ms)	3,203.13
JDBC Time (ms)	93	Latency (ms)	0
Thread Name	http-bio-80-exec-67	Thread ID	1819
IP		Instance ID	
Agent Type	WAS	Transaction ID	16044e99575e-199e9ec195f9aee7866
Error Message			

# Server Hang



**Request Velocity**

0.0tps  
0.00s  
2u  
250

Number of Requests

cid11

■ Satisfying ■ Tolerating ■ Frustrating

**Thread Dump List**

#	Created	Host	Instance	Level	UUID
1	2017-10-30 11:25:45			INFO	C85F3F56-6AF3-4973-8E4...
2	2017-10-30 11:25:44			INFO	ED1EEAE7-0...
3	2017-10-30 11:24:45			INFO	CC93D779-4...
4	2017-10-30 11:24:44			INFO	313CA30C-4...
5	2017-10-30 11:23:27			INFO	6B39CEFF-3...

**Thread Dump**

```
33444 "http-thread-pool-threads - 1" prio=10 tid=0x00007f26f40b7000 nid=0x44fc...  
33445 java.lang.Thread.State: WAITING (parking)  
33446 at sun.miscUnsafe.park(Native Method)  
33447 - parking to wait for <0x0000000788bf5578> (a java.util.concurrent.locks.AbstractQueuedSynchronizer$ConditionObject)  
33448 at java.util.concurrent.locks.LockSupport.park(LockSupport.java:186)  
33449 at java.util.concurrent.locks.AbstractQueuedSynchronizer$ConditionObject.await(AbstractQueuedSynchronizer$ConditionObject.java:213)  
33450 at org.apache.http.pool.AbstractConnPool.access$200(AbstractConnPool.java:67)  
33451 at org.apache.http.pool.AbstractConnPool$2.get(AbstractConnPool.java:243)  
33452 - locked <0x00000007935133e8> (a org.apache.http.pool.AbstractConnPool$2)  
33453 at org.apache.http.pool.AbstractConnPool$2.get(AbstractConnPool.java:191)  
33454 at org.apache.http.impl.conn.PoolingHttpClientConnectionManager.leaseConnection(PoolingHttpClientConnectionManager.java:385)  
33455 at org.apache.http.impl.conn.PoolingHttpClientConnectionManager$1.get(PoolingHttpClientConnectionManager$1.java:47)  
33456 at org.apache.http.impl.execchain.MainClientExec.execute(MainClientExec.java:191)  
33457 at org.apache.http.impl.execchain.ProtocolExec.execute(ProtocolExec.java:185)  
33458 at org.apache.http.impl.execchain.RetryExec.execute(RetryExec.java:89)  
33459 at org.apache.http.impl.execchain.MainClientExec.execute(MainClientExec.java:191)  
33460 at org.apache.http.impl.execchain.ProtocolExec.execute(ProtocolExec.java:185)  
33461 at org.apache.http.impl.execchain.RetryExec.execute(RetryExec.java:89)  
33462 at org.apache.http.impl.execchain.MainClientExec.execute(MainClientExec.java:191)
```

**Pending Request가 Apache Commons Http Client Pool에서 Connection을 가져오려고 기다리고 있음**

**HttpClient Pool의 개수 조절 필요**

**HttpClient Pool의 Timeout 설정 필요**

# Runtime Exception

Agent Type	Server IP	Client IP	Instance ID	URL	Status	Duration(ms)	SQL Time(ms)	Fetch Gab	Fetch Count	External Time	CPU Time(ms)	Start Time
WAS					500	23,749	0	0	0	0	13.64	2018-01-24 10:21:22.731
WAS					500	1,754	405	5	57	0	194.00	2018-01-24 11:18:58.449
WAS				rpt.do	500	1,327	258	2	44	0	57.52	2018-01-24 10:54:35.703
WAS				rpt.do	500	1,257	55	7	45	0	105.93	2018-01-24 09:21:12.665
WAS				rpt.do	500	1,108	305	4	47	0	55.80	2018-01-24 10:37:26.892
WAS				rpt.do	500	1,063	259	4	44	0	64.33	2018-01-24 08:50:43.556
WAS					500	1,058	1,037	0	40	0	35.89	2018-01-24 08:33:50.325
WAS				rpt.do	500	964	191	4	41	0	49.24	2018-01-24 10:32:51.798
WAS				rpt.do	500	952	339	1	38	0	86.03	2018-01-24 07:45:50.215
WAS				rpt.do	500	943	155	2	47	0	49.16	2018-01-24 10:37:06.733

XXXToDoCntPortlet.jsp의 102번째 라인에서 오류 발생

Transaction Detail Trace StackTrace

Client IP [redacted] User Location [redacted]

Start Time 2018-01-24 08:33:50.325 End Time 2018-01-24 08:33:51.383

Duration (ms) 1,058 CPU Time (ms) 35.89

JDBC Time (ms) 1,037 Latency (ms) 0

Thread Name http-thread-pool-threads - 104 Thread ID 399

IP [redacted] Instance ID instance22

Agent Type WAS Transaction ID 161255b1e23-18490e92c7c7a9d1a1

Error Message

```
JBK004838: An exception occurred processing JSP page /WEB-INF/jsp/com/E...llet.jsp at line 102
100:         < %
101:             int pageCount = 0;
102:             for ( int i = 0; i < itemVO.length; i++ ) {
103:                 if("S".equals(itemVO[i].getItem2()) && "S".equals(itemSysVO[1].getItem2()) && "000".equals(itemVO[i].getConfigItemid())) {
104:                     pageCount++; height +=20;X;
105:                 }
106:             }
107:         < /%
108:         < span>< a href="#" onclick="parent.load_inb('MSRP_ONLINE', 'OCT_OCH_MDL'); return(false);">할증금기획 : < /a>
Stacktrace:
at org.apache.jsp.MEB_002DINF_jsp.com.BmsToDoCntPortlet_jsp._jspService(BmsToDoCntPortlet_jsp.java:288)
at org.apache.jasper.runtime.HttpServletBase.service(HttpServletBase.java:69)
```

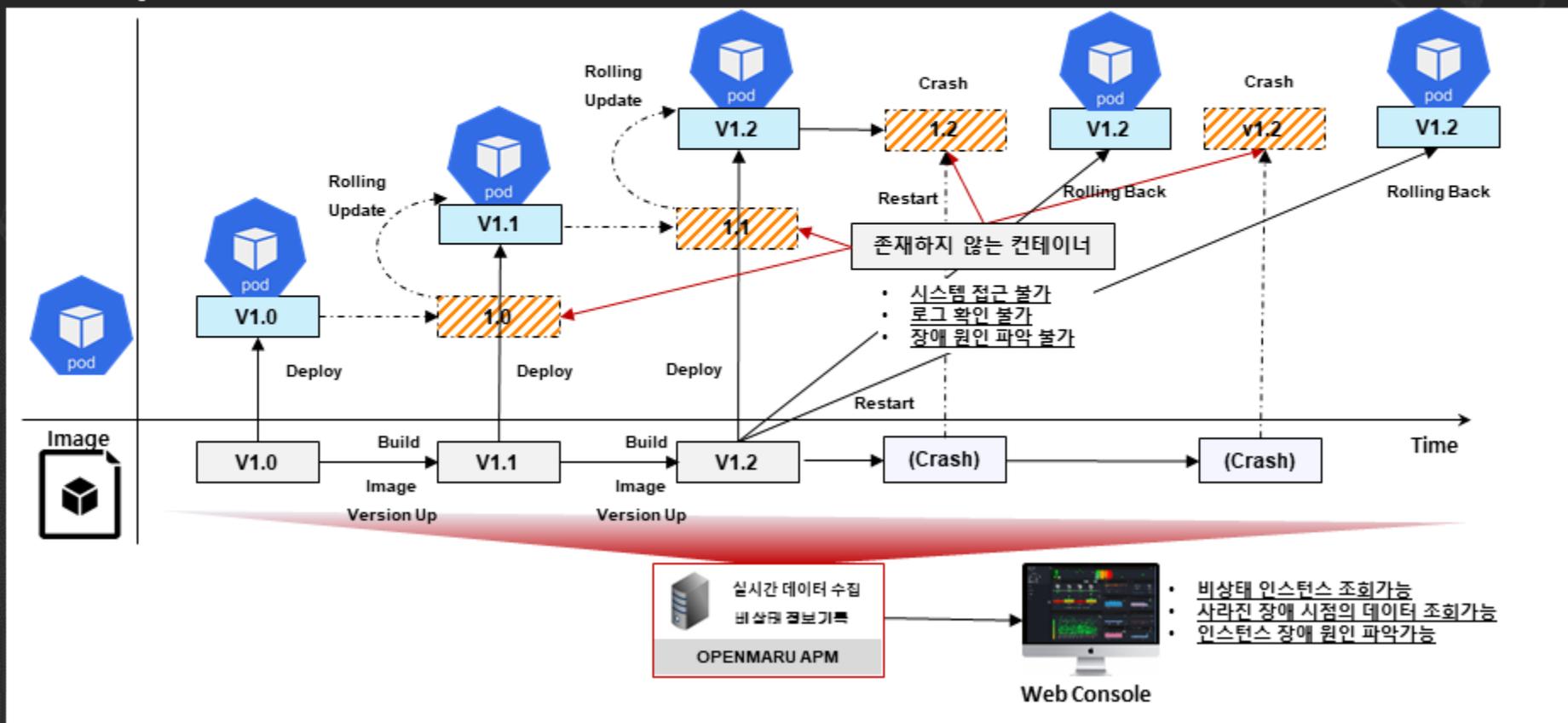
PaaS 운영



기존환경 대비 Container 환경 모니터링의 특성

# 기존환경 대비 Container 환경 모니터링의 특성

- VM 환경에서는 동일한 인스턴스에 새 버전 애플리케이션을 배포
- Container 환경에서는 새로운 인스턴스에 새 버전 애플리케이션을 배포
  - Openshift (Kubernetes) 배포 프로세스



# 비상태 인스턴스 모니터링 정보 조회 절차(1/3)



#	Enable	Ena...	Host Name	IP Address	Instance ID	Type	Status	First Date
1	<input type="checkbox"/>	Hide	custom-app-19-g5v9t	10.131.0.112	Container-19-g...	WAS	STOPPED	2021-01-31 16
2	<input type="checkbox"/>	Hide	custom-app-20-bggjn	10.131.0.116	Container-20-b...	WAS	STOPPED	2021-01-31 16
3	<input type="checkbox"/>	Hide	custom-app-21-pdvl7	10.131.0.119	Container-21-p...	WAS	STOPPED	2021-01-31 16
4	<input type="checkbox"/>	Hide	custom-app-22-cmg2f	10.131.0.124	Container-22-c...	WAS	STOPPED	2021-01-31 17
5	<input type="checkbox"/>	Hide	custom-app-23-nf6js	10.131.0.127	Container-23-n...	WAS	STOPPED	2021-01-31 17
6	<input type="checkbox"/>	Hide	custom-app-24-c9smx	10.131.0.131	Container-24-c...	WAS	STOPPED	2021-01-31 17
7	<input type="checkbox"/>	Hide	custom-app-25-w56pk	10.131.0.134	Container-25-...	WAS	STOPPED	2021-01-31 17
8	<input type="checkbox"/>	Hide	custom-app-26-bwpkn	10.131.0.137	Container-26-b...	WAS	STOPPED	2021-01-31 17
9	<input type="checkbox"/>	Hide	custom-app-27-fh2gh	10.131.0.139	Container-27-f...	WAS	STOPPED	2021-01-31 18
10	<input checked="" type="checkbox"/>	Show	custom-app-28-tszdk	10.131.0.142	Container-28-t...	WAS	STOPPED	2021-01-31 18
11	<input checked="" type="checkbox"/>	Show	custom-app-29-6mw29	10.131.0.145	Container-29-...	WAS	RUNNING	2021-01-31 18

## 비상태 인스턴스 모니터링 정보 조회 절차(2/3)

비상태 인스턴스 모니터링정보 활성화 전



비상태 인스턴스 모니터링정보 활성화 후



# 비상태 인스턴스 모니터링 정보 조회 절차(3/3)



Transactions > 2021-01-31 18:44:24 ~ 2021-01-31 18:45:51 > 1602ms ~ 4959ms

Agent	Server IP	Client IP	Instance ID	URL	Status	Warn	Duration(ms)	SQL Time(ms)	Fetch Gab	Fetch Count	Est. Time	CPU(ms)	Start Time
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template2	200	0	4,945	0	0	0	4,934	14.60	2021-01-31 18:44:29.312
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template	200	0	4,772	0	0	0	1,985	46.15	2021-01-31 18:45:07.885
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template	200	0	4,630	0	0	0	1,783	41.11	2021-01-31 18:44:38.809
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template2	200	0	4,565	0	0	0	4,560	7.99	2021-01-31 18:44:29.888
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http	200	0	4,532	0	0	0	4,548	23.04	2021-01-31 18:44:51.097
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template	200	0	4,542	0	0	0	1,908	34.33	2021-01-31 18:45:39.943
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template2	200	0	4,340	0	0	0	4,333	7.38	2021-01-31 18:45:29.080
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http	200	0	4,338	0	0	0	4,336	20.49	2021-01-31 18:44:47.992
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http	200	0	4,219	0	0	0	4,277	20.25	2021-01-31 18:44:22.715
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template2	200	0	4,150	0	0	0	4,142	7.56	2021-01-31 18:44:40.785
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http	200	0	4,071	0	0	0	4,068	22.39	2021-01-31 18:45:25.969
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http	200	0	4,034	0	0	0	4,032	20.24	2021-01-31 18:44:29.681
WAS	10.129.0.60	192.168.23.100	jws53_svc1-25-7cdgf	/spring/test/http/rest/template	200	4	4,034	0	0	0	1,814	36.69	2021-01-31 18:45:24.964

Transaction Detail | Trace | StackTrace | Headers | Cookies

Name	Value	Name	Value
Request URL	GET /spring/test/http/rest/template2	Params	
Request Host	khan-jws53-svc1-test1-app-ocp-test-0k-openmaru.com	Status Code	200
Client IP	192.168.23.100	User Agent	Apache-HttpClient/4.5.3 (Java/1.8.0_192)
Start Time	2021-01-31 18:44:29.312	End Time	2021-01-31 18:44:34.257
Duration (ms)	4,945	CPU Time (ms)	14.60
JDBC Time (ms)	0	Latency (ms)	0
Thread Name	http-nio-8080-exec-4	Thread ID	41
IP	10.129.0.60	Instance ID	jws53_svc1-25-7cdgf
Agent Type	WAS	Transaction ID	Relationship > 17757042x11-284e87bc4ea317b358

Method Traces

Legend: 0 <= time < 1,000ms | 1,000ms <= time < 3,000ms | 3,000ms <= time

PaaS 운영

애플리케이션 장애의 대표적인 패턴 확인



# 애플리케이션 장애의 대표적인 패턴



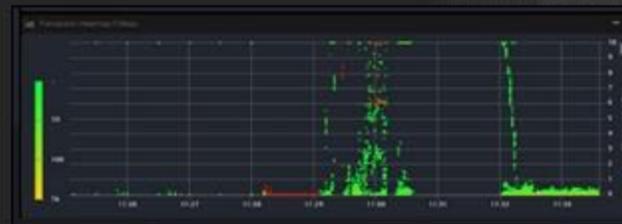
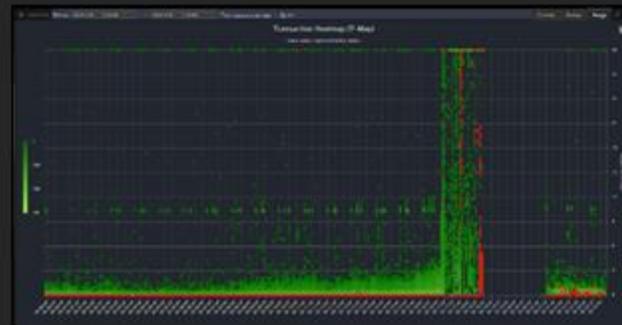
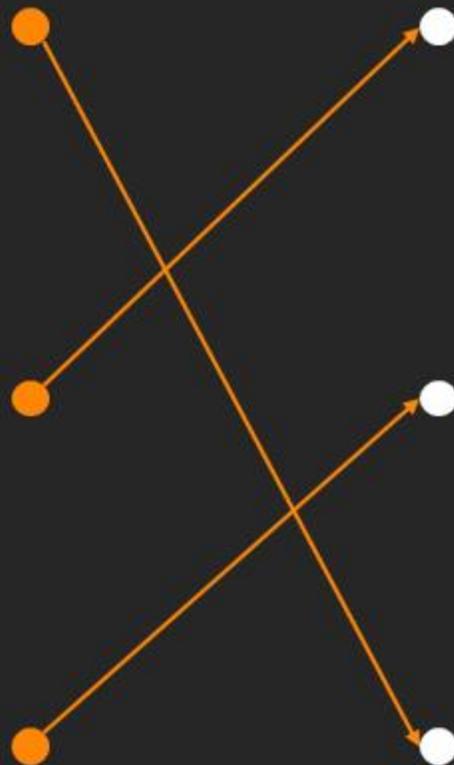
Full GC



Server Hang



Runtime Exception





openmaru

제품 / 서비스에 관한 문의

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