Pinpoint : Enhance Observability of Distributed Systems

김성욱

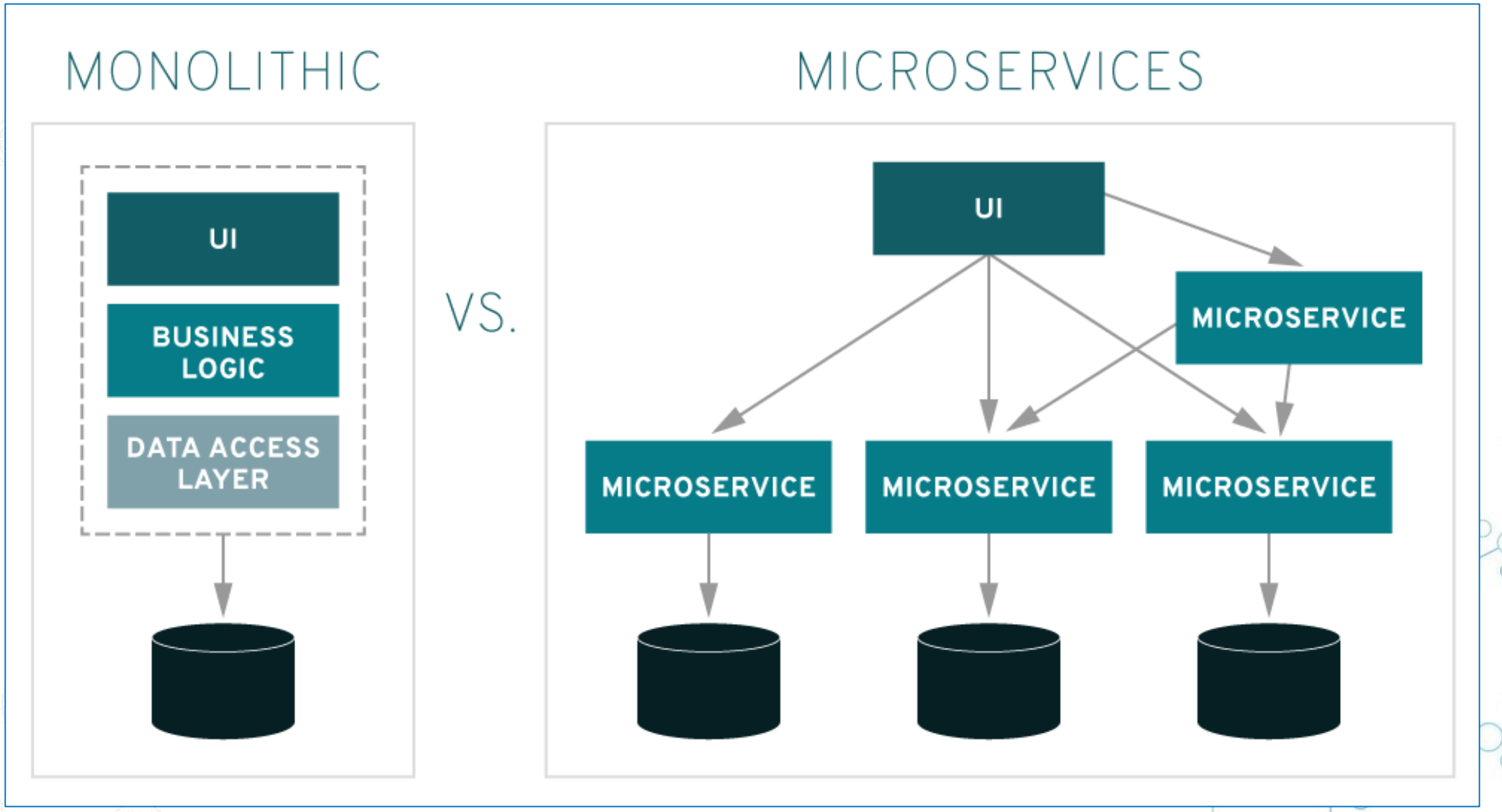
Naver / Observability Platform

What is an APM?

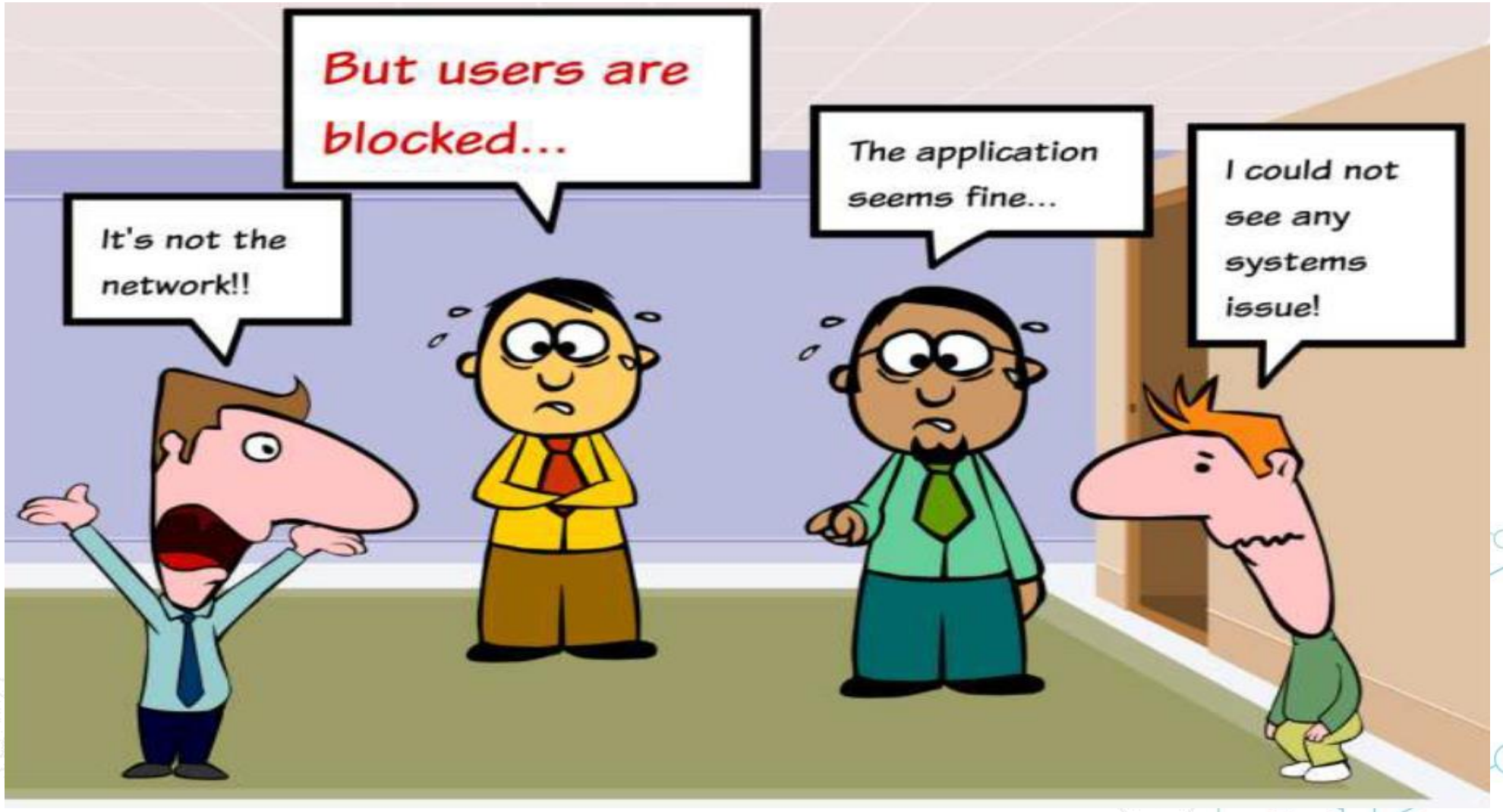
- Wikipedia
  - Application Performance Management (APM) is the monitoring and management of performance and availability of software applications.

- Pinpoint Github
  - Pinpoint is an open source APM (Application Performance Management) tool for large-scale distributed systems written in Java.

Why need an APM?



Why need an APM?



출처 : https://www.slideshare.net/SecurActive/workshop-apm-in-a-cloud-virtualized-environment

Why need an APM?

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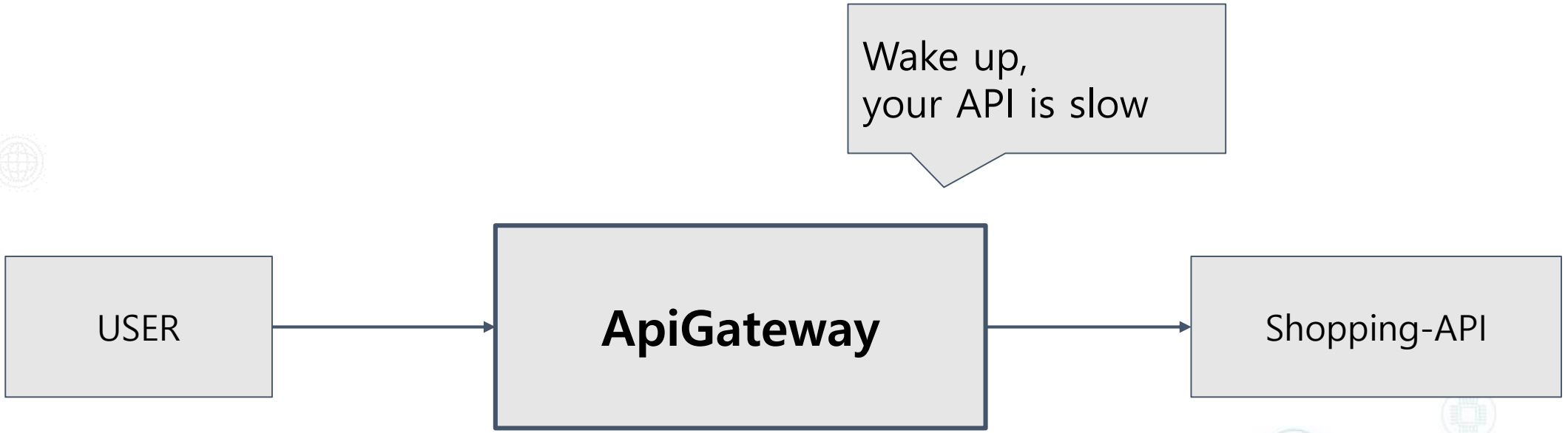

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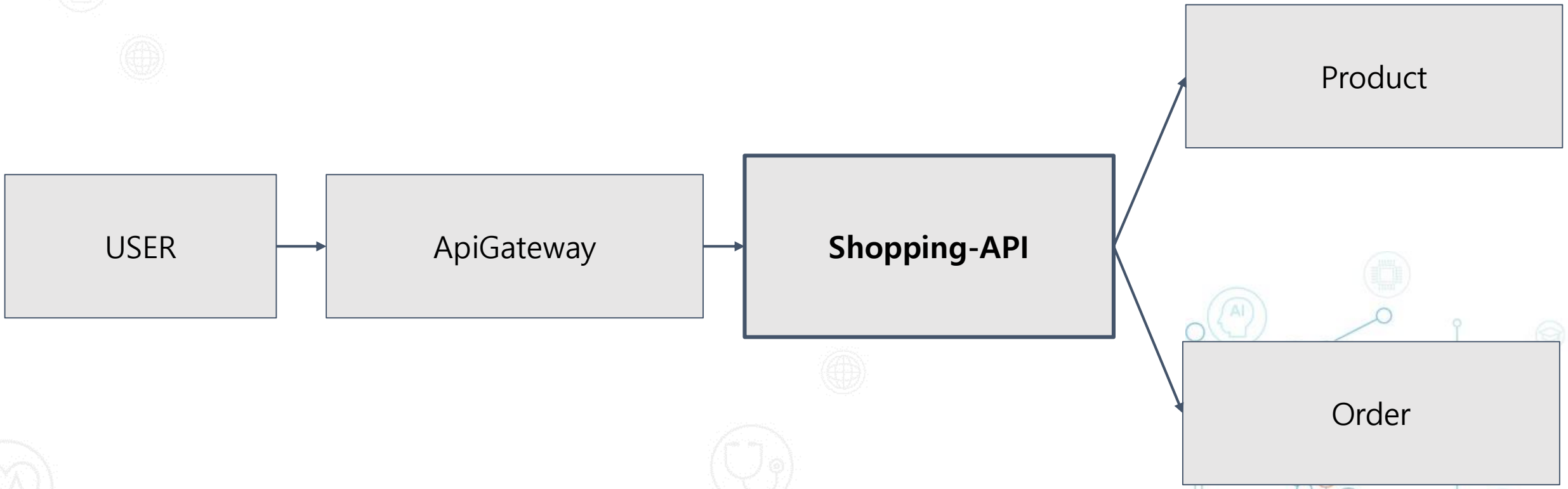
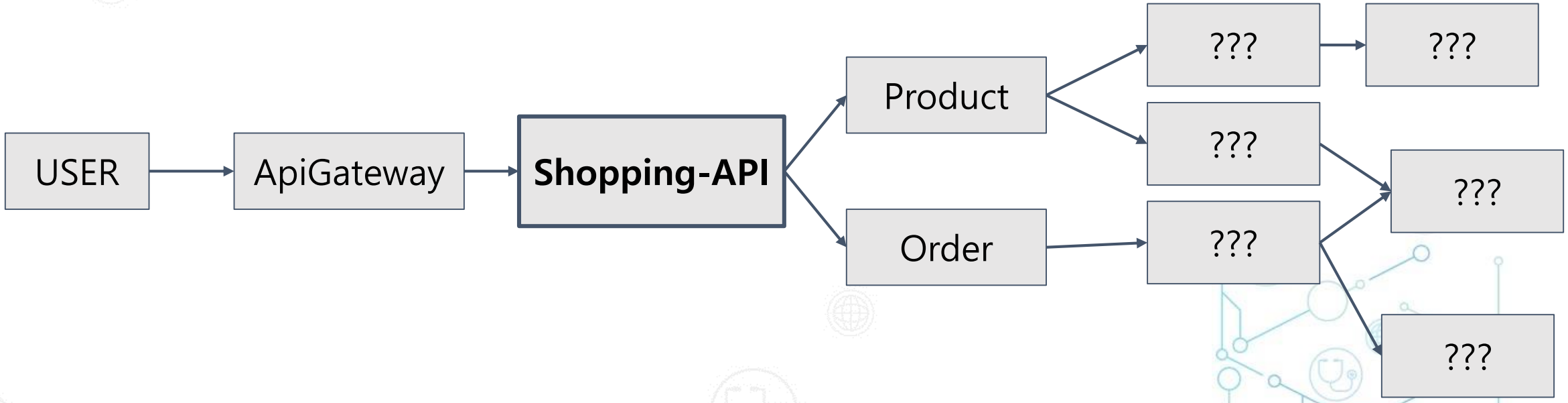
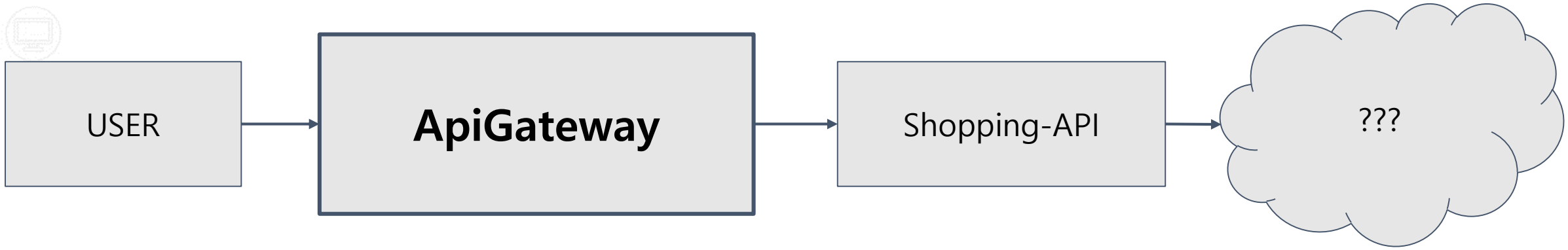


Why need an APM?



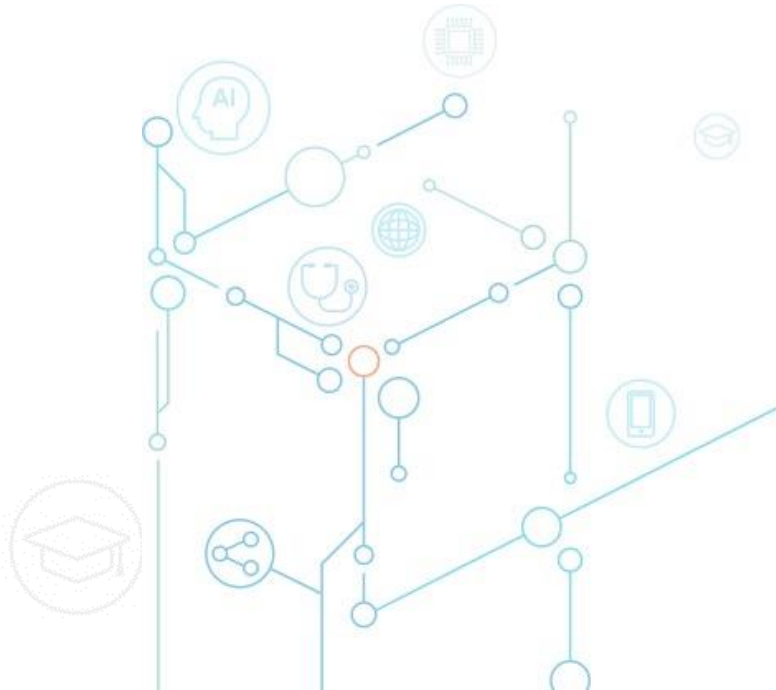
Why need an APM?



- Logs are distributed
- Delays and failures are often caused by other nodes, as well as edges in the call graph
- Need visibility to the whole architecture to identify root cause

Why is an APM?

- Our little scenario using pinpoint



Features

PINPOINT

Bird Eye View

Finding Slow Transactions

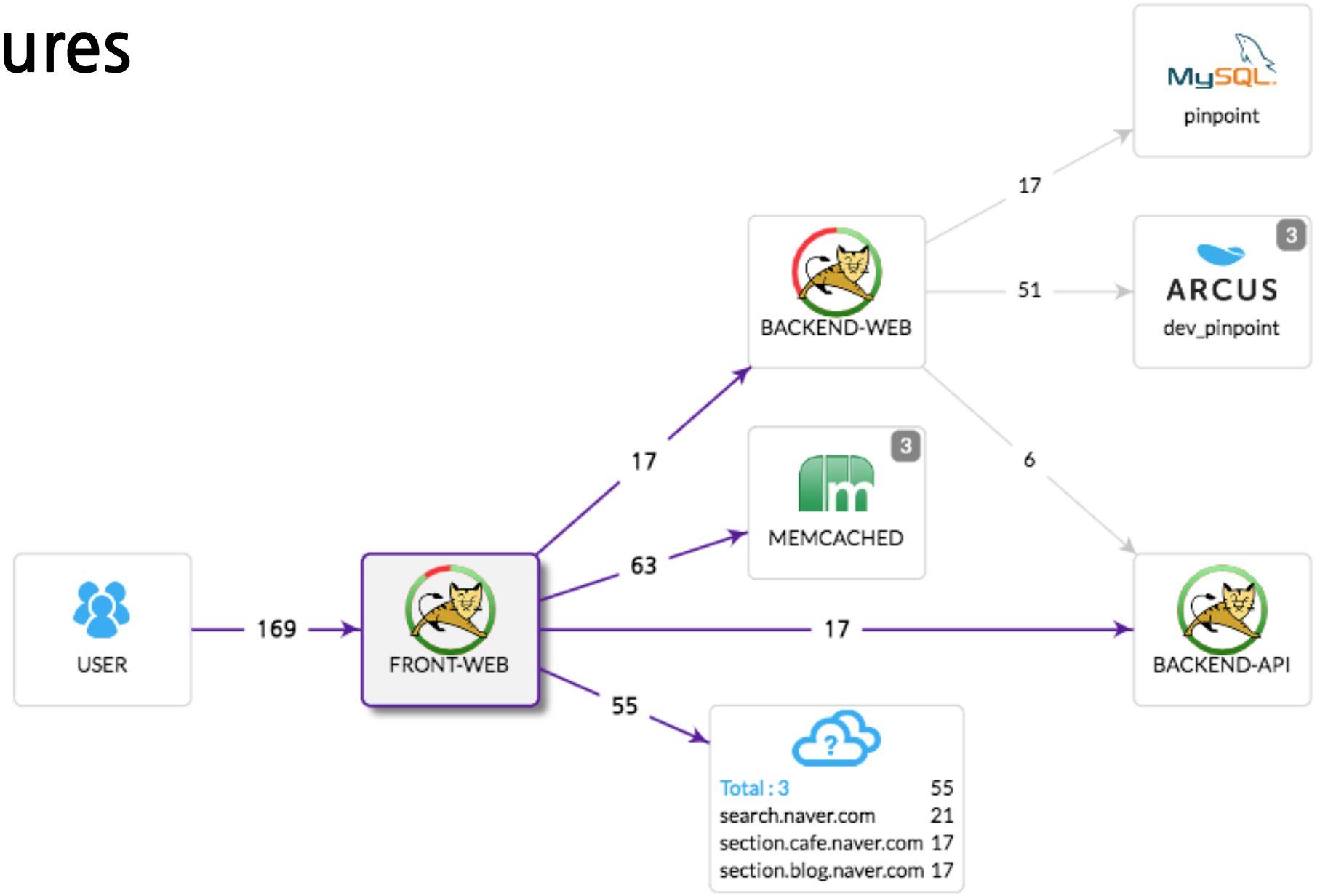
Distributed Tracing

DevOps

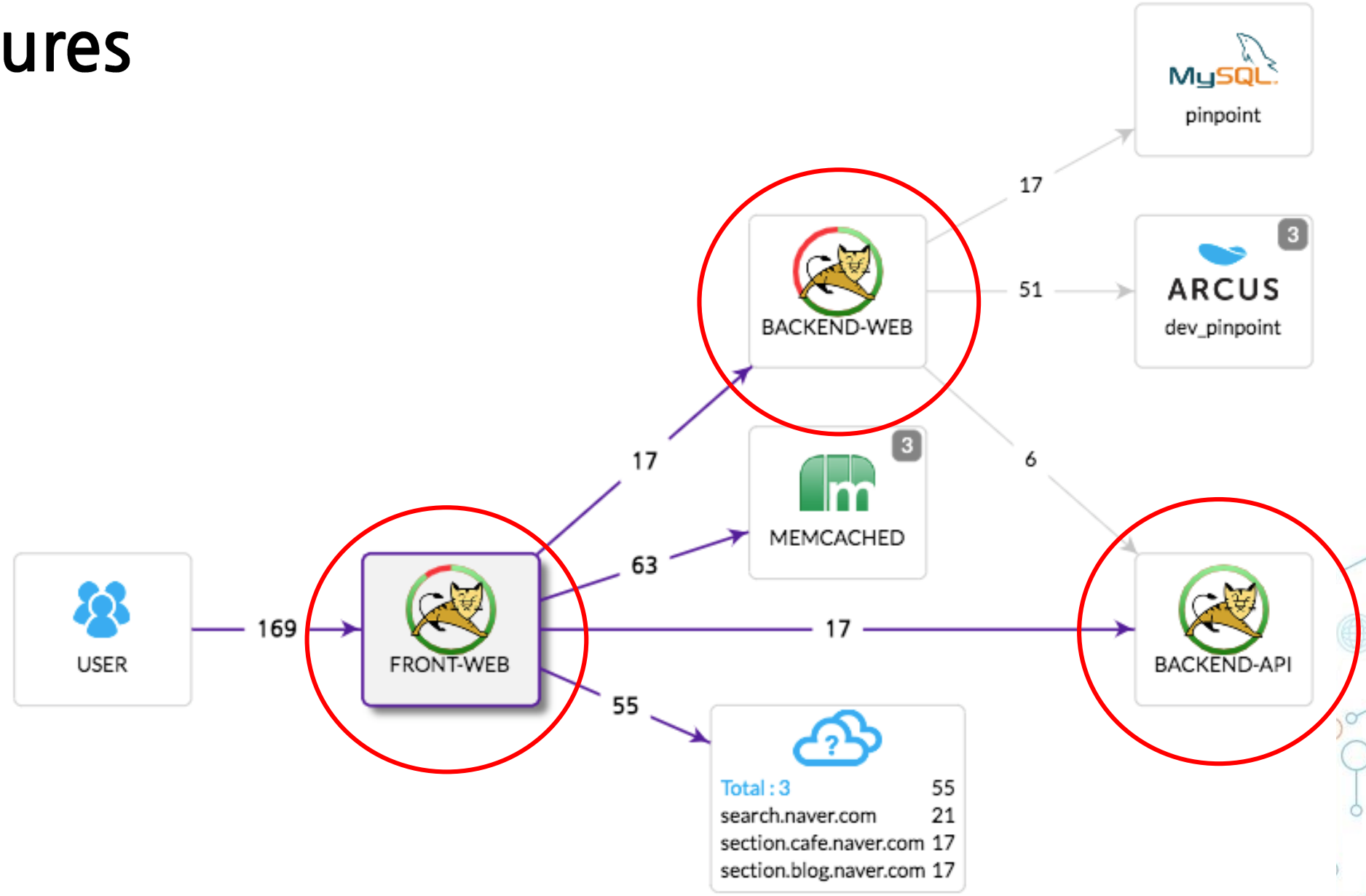
Scalable

Minimum Overload

Features


MySQL
pinpoint
17
BACKEND-WEB
51
3
ARCUS
dev_pinpoint
6
17
3
MEMCACHED
63
USER
169
FRONT-WEB
17
BACKEND-API
55
Total : 3 55
search.naver.com 21
section.cafe.naver.com 17
section.blog.naver.com 17

Features


MySQL
pinpoint
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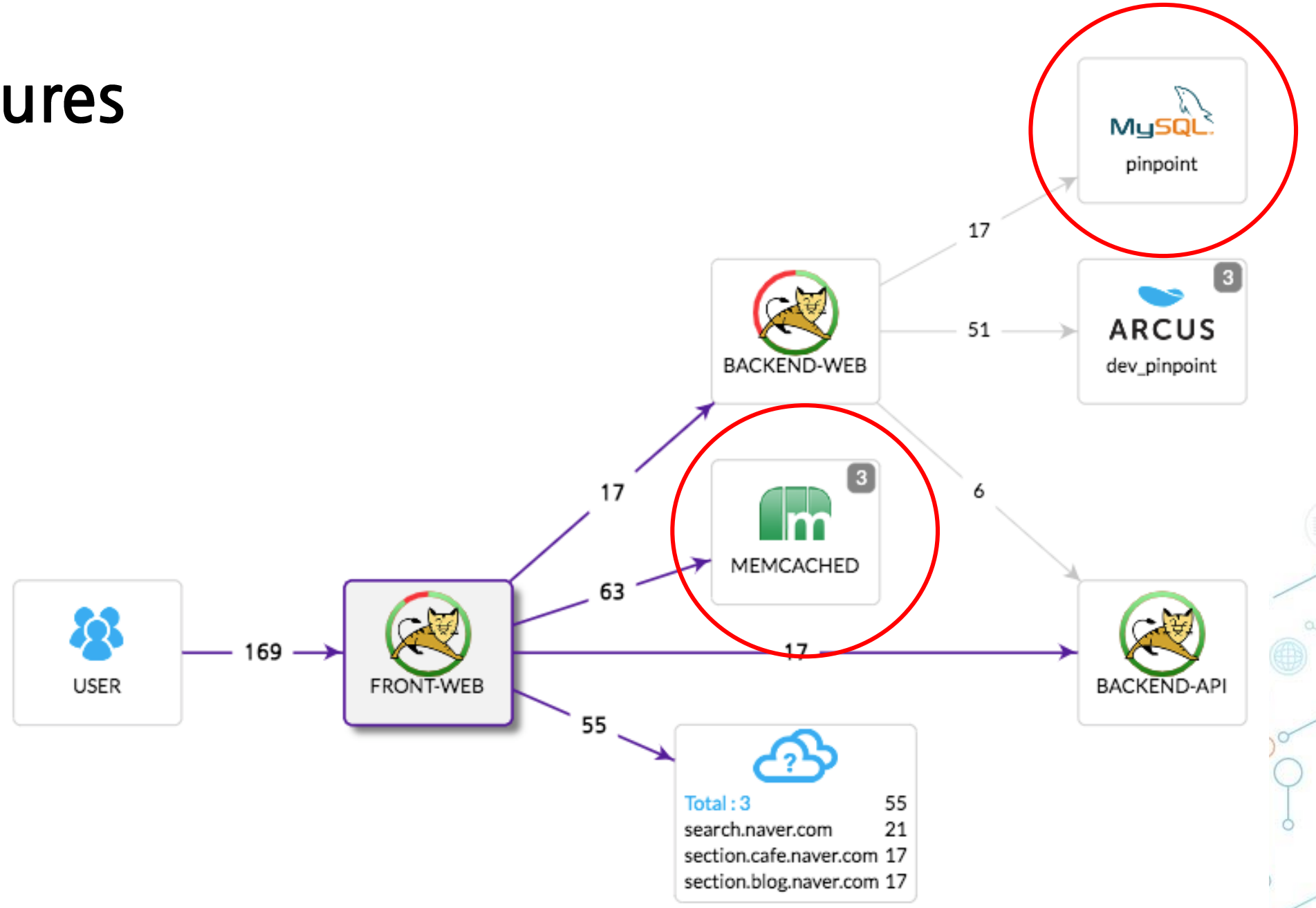
Features


MySQL
pinpoint
17
BACKEND-WEB
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169
USER
FRONT-WEB
BACKEND-API
55
Total : 3 55
search.naver.com 21
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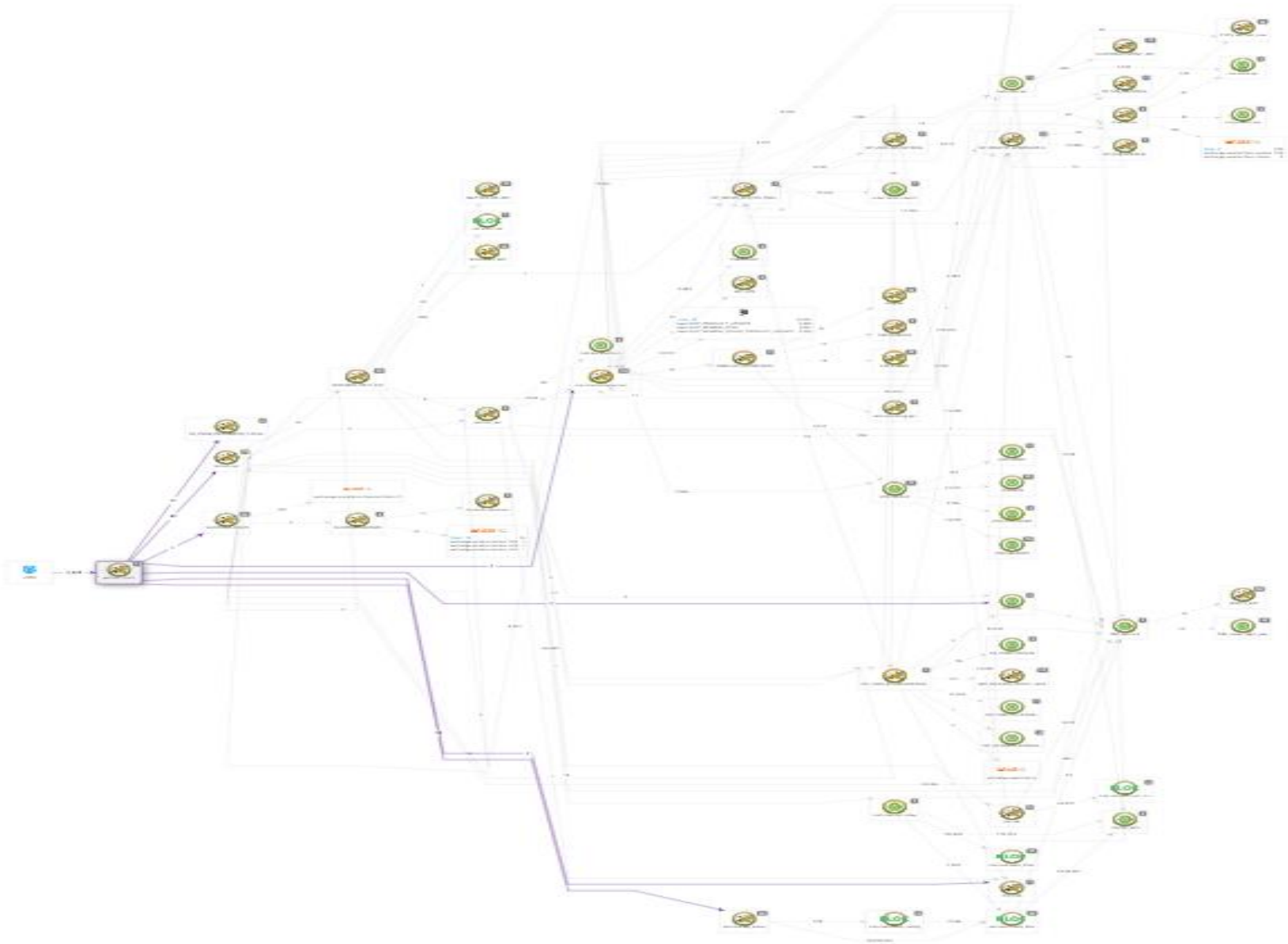
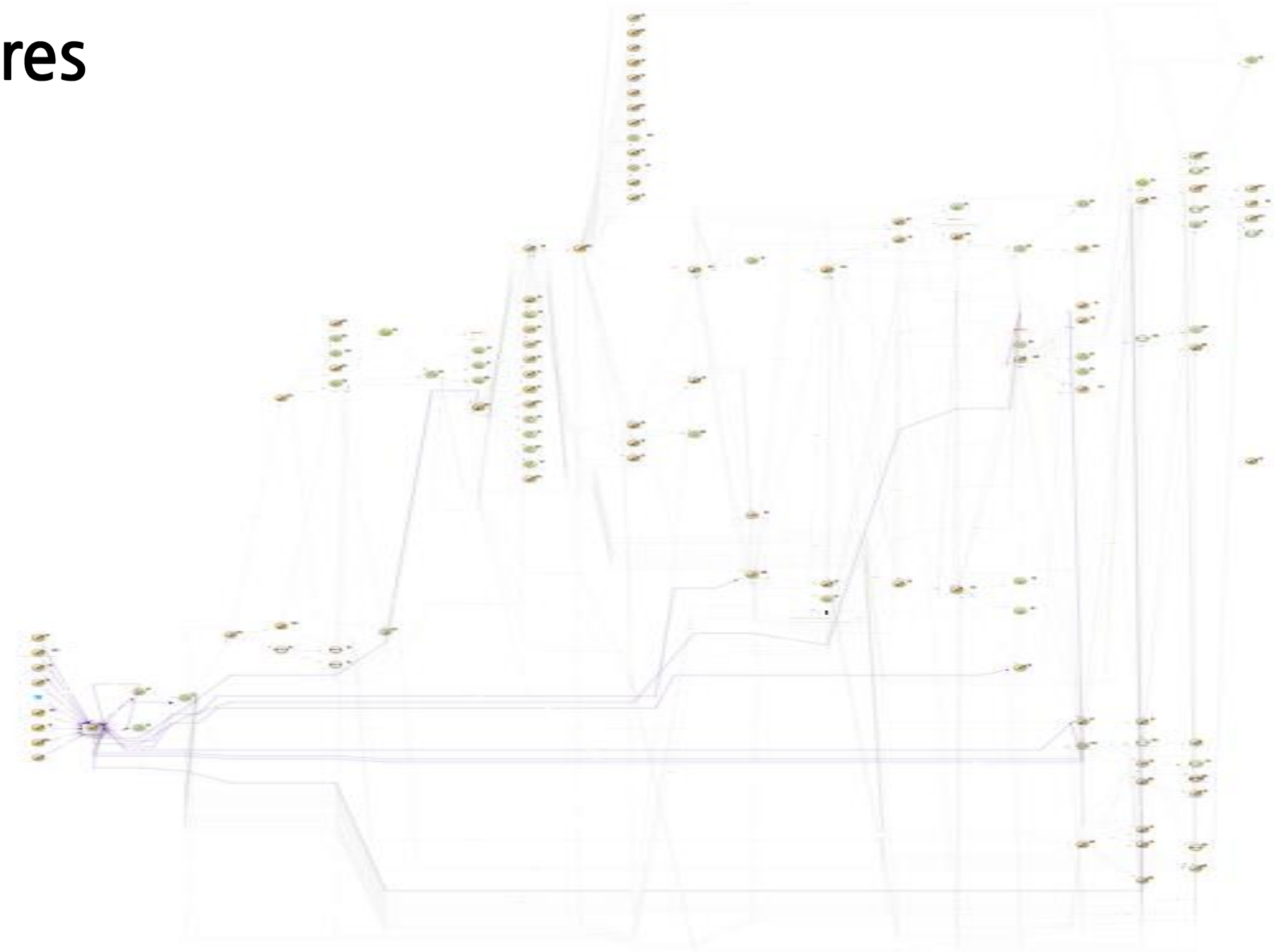
Features

USER
1,446
ApiGateway
1,446
Shopping-Api
1,403
Shopping-Order
1,282
267
2,370
Shopping-Product
1,758
MySQL
product
Shopping-Payment
267
vendor.payment.card.com:8179
MySQL
order

Features



Features



Features

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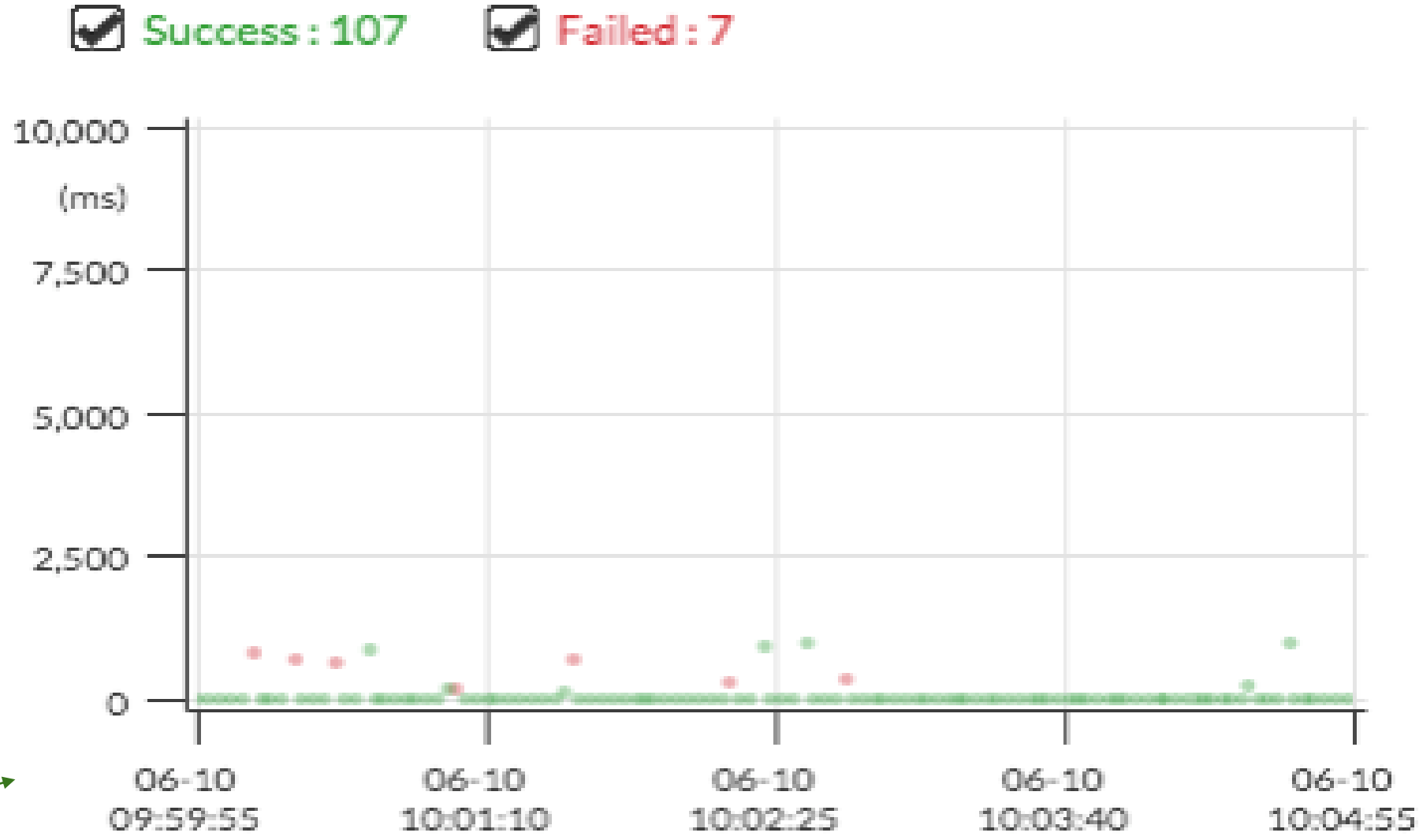
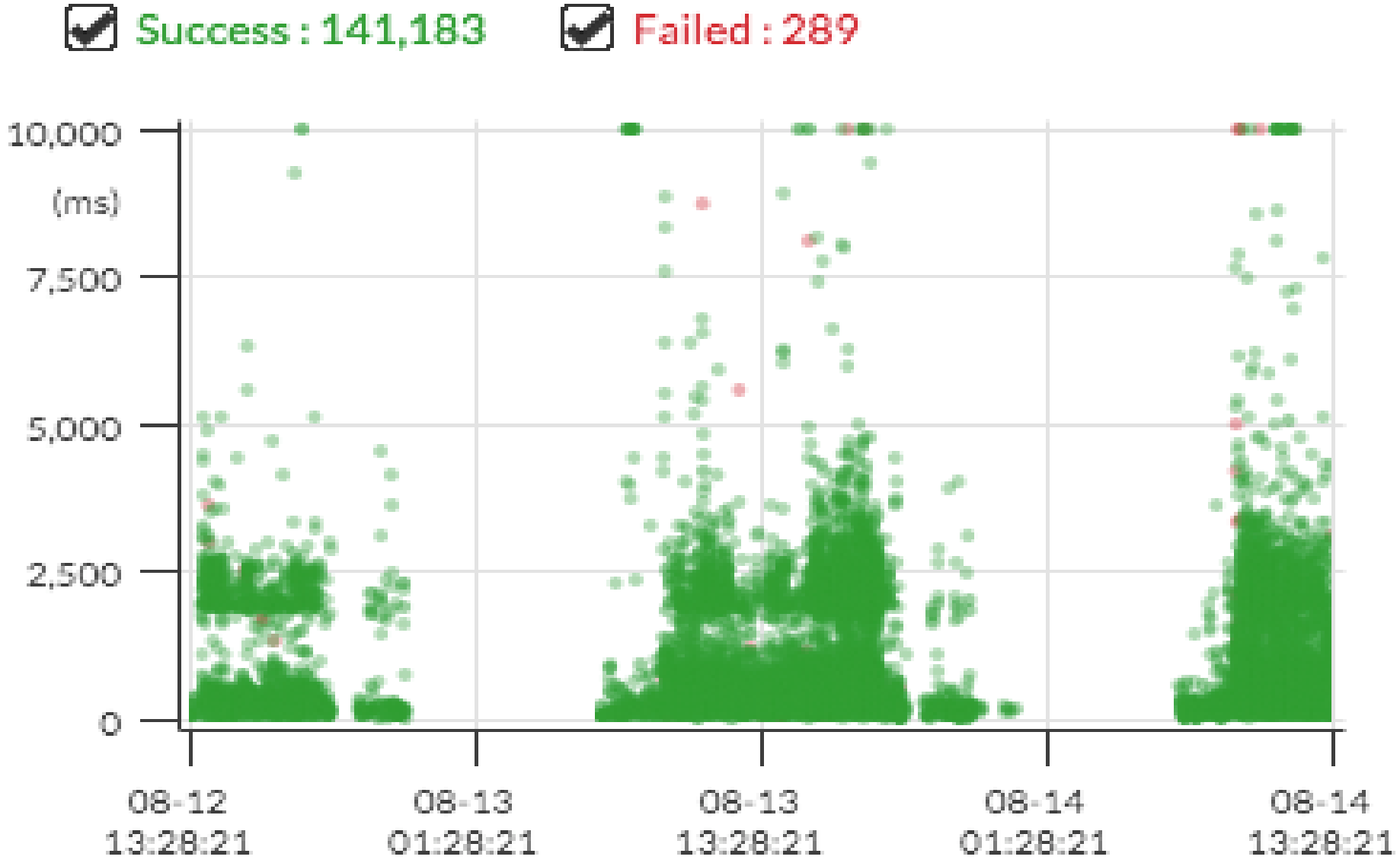
Features

Response Time
of each Transaction

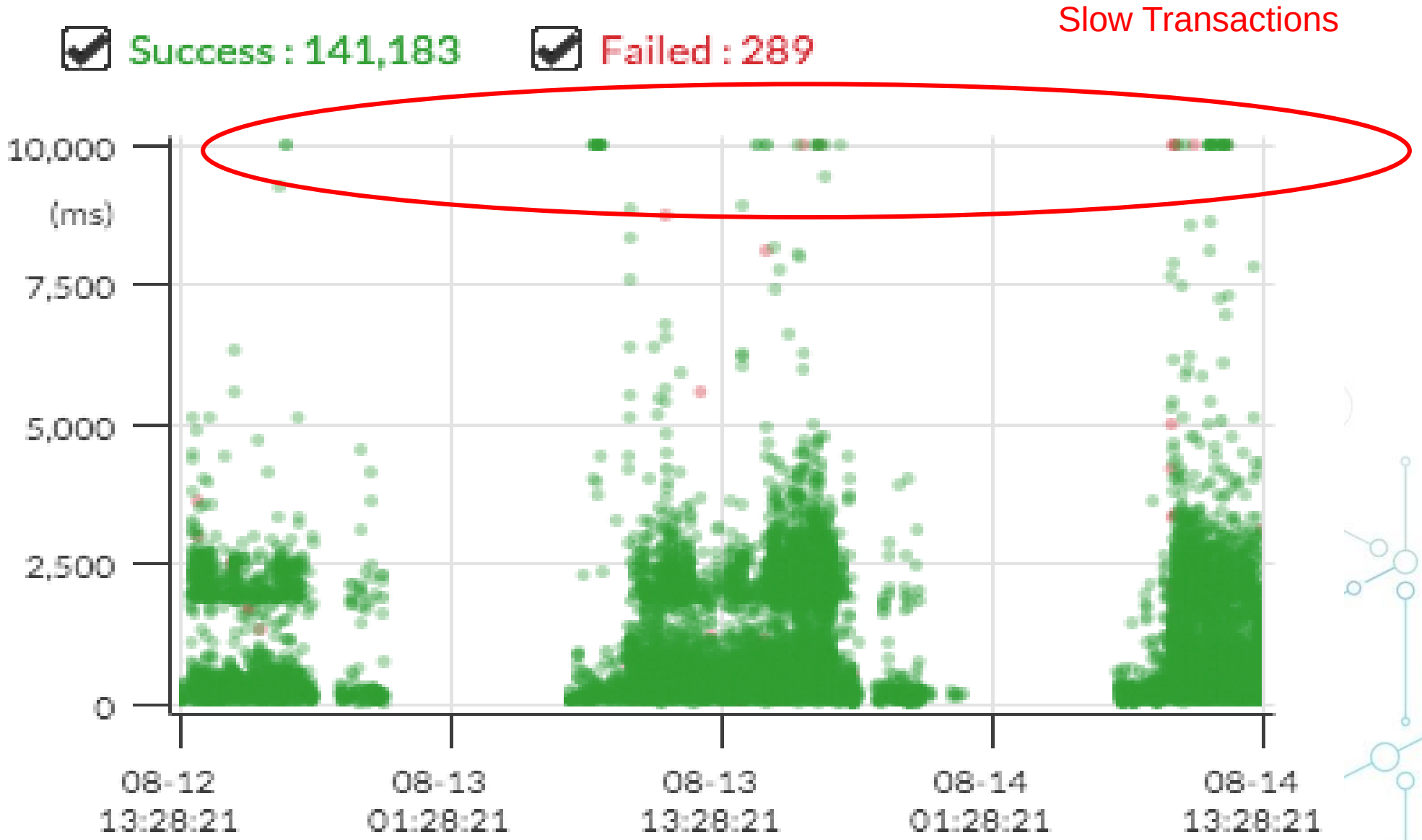


Date & Time

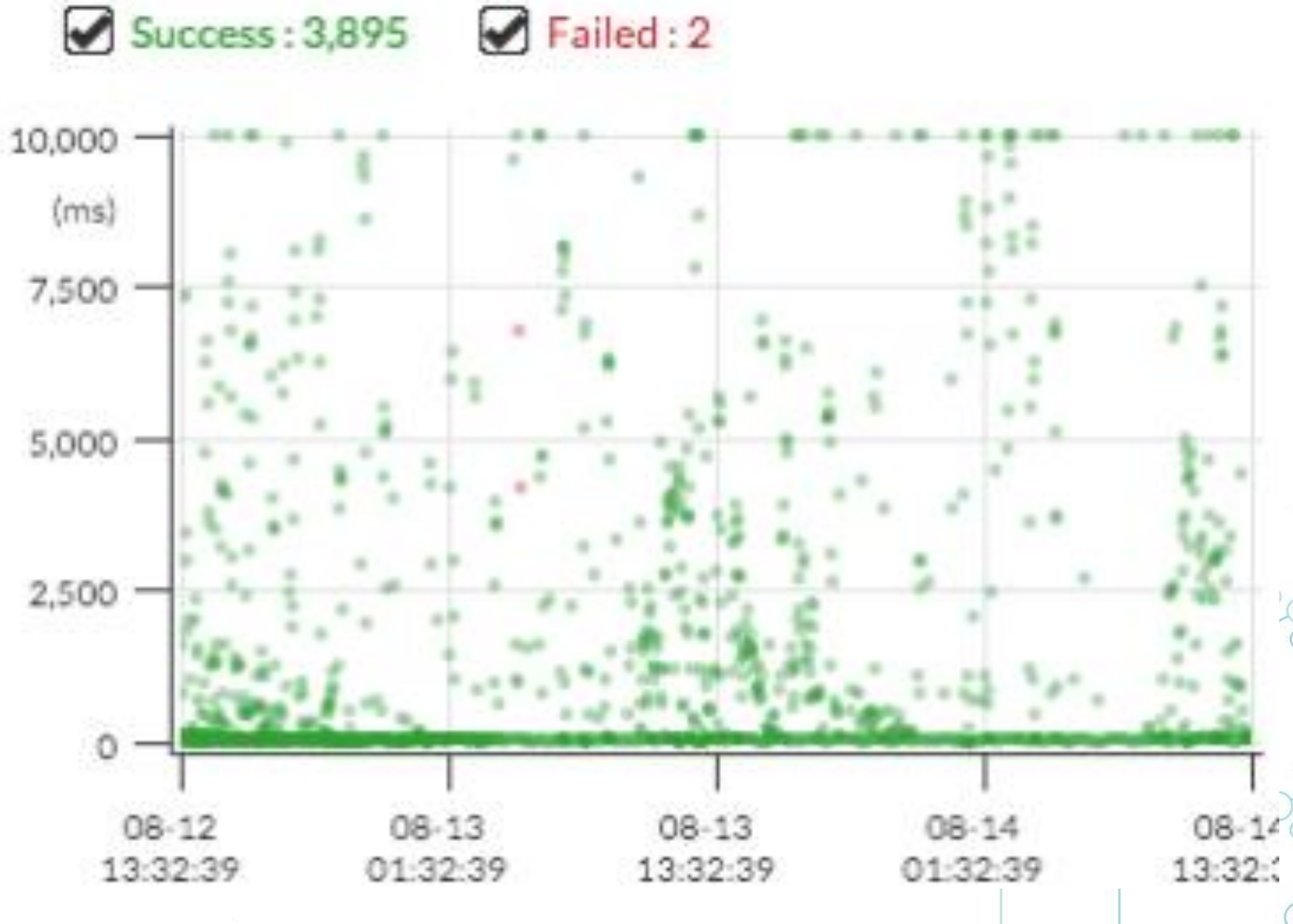
Features


Success : 141,183
Failed : 289
10,000
(ms)
7,500
5,000
2,500
0
08-12
13:28:21
08-13
01:28:21
08-13
13:28:21
08-14
01:28:21
08-14
13:28:21

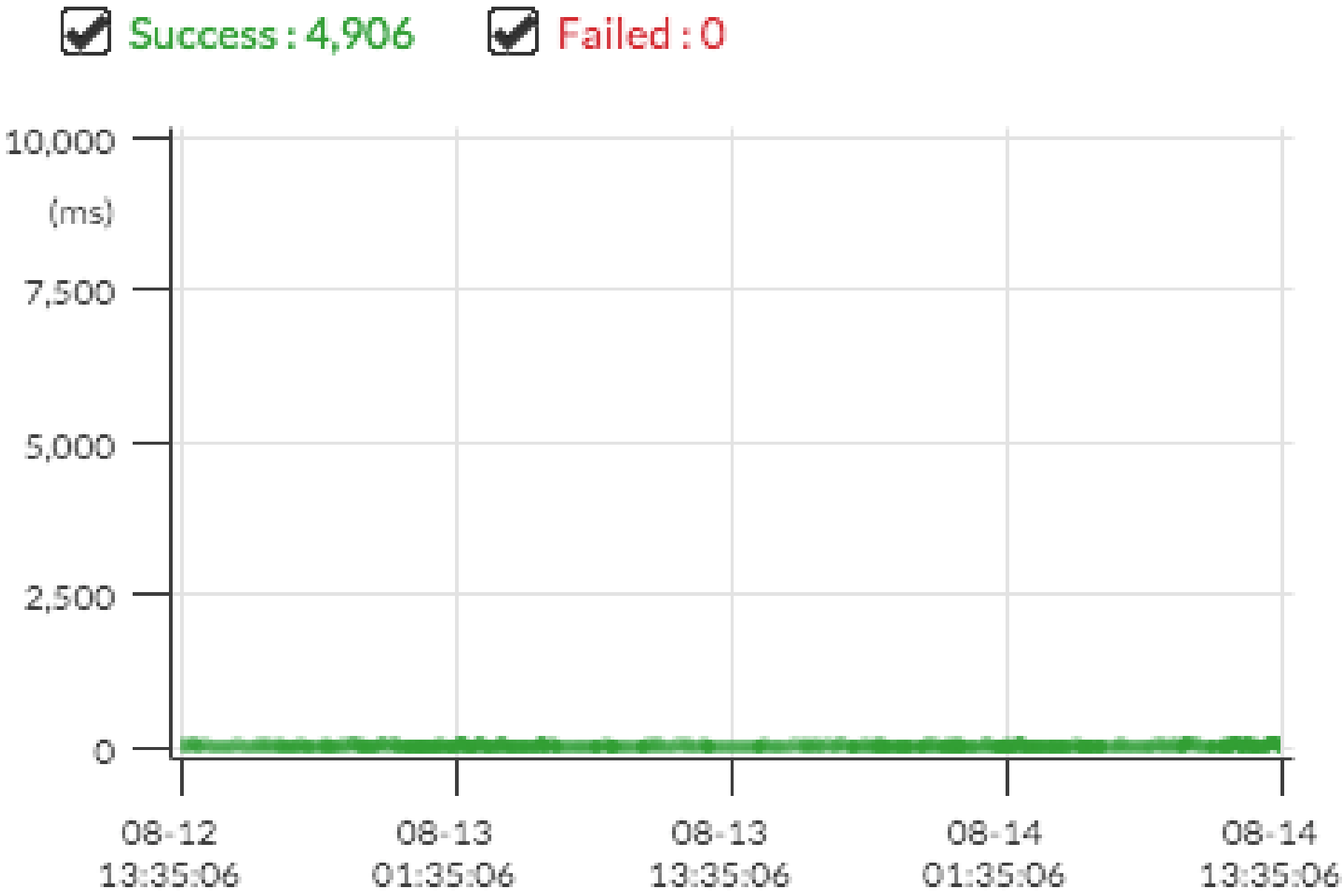
Features


Slow Transactions
Success : 141,183
Failed : 289
10,000
(ms)
7,500
5,000
2,500
0
08-12
13:28:21
08-13
01:28:21
08-13
13:28:21
08-14
01:28:21
08-14
13:28:21

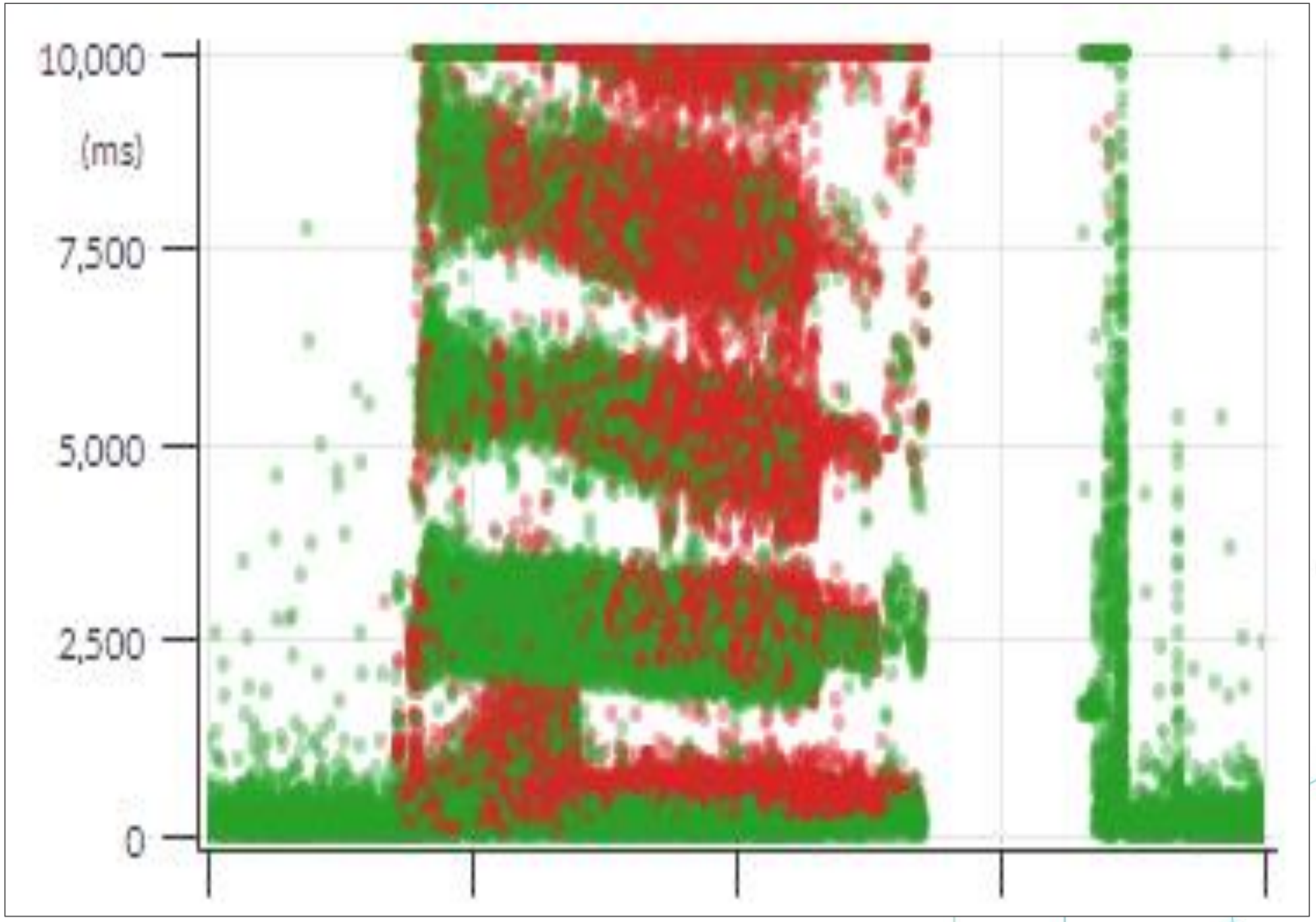
Features


Success : 3,895
Failed : 2
10,000
(ms)
7,500
5,000
2,500
0
08-12
13:32:39
08-13
01:32:39
08-13
13:32:39
08-14
01:32:39

Features

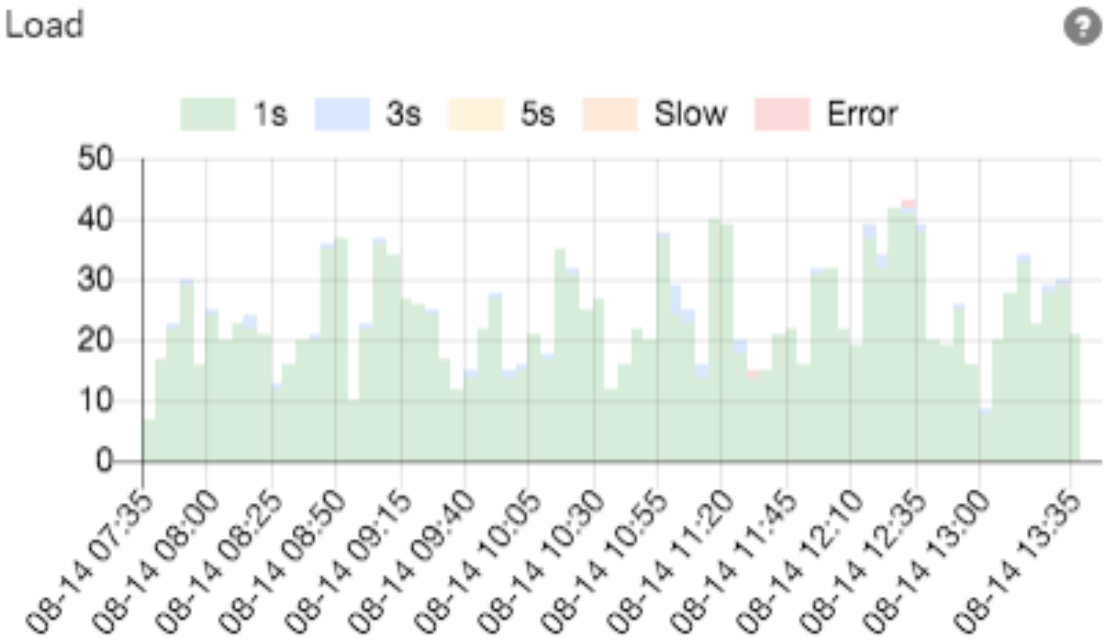

Success : 4,906
Failed : 0
10,000
(ms)
7,500
5,000
2,500
0
08-12
13:35:06
08-13
01:35:06
08-13
13:35:06
08-14
01:35:06
08-14
13:35:06

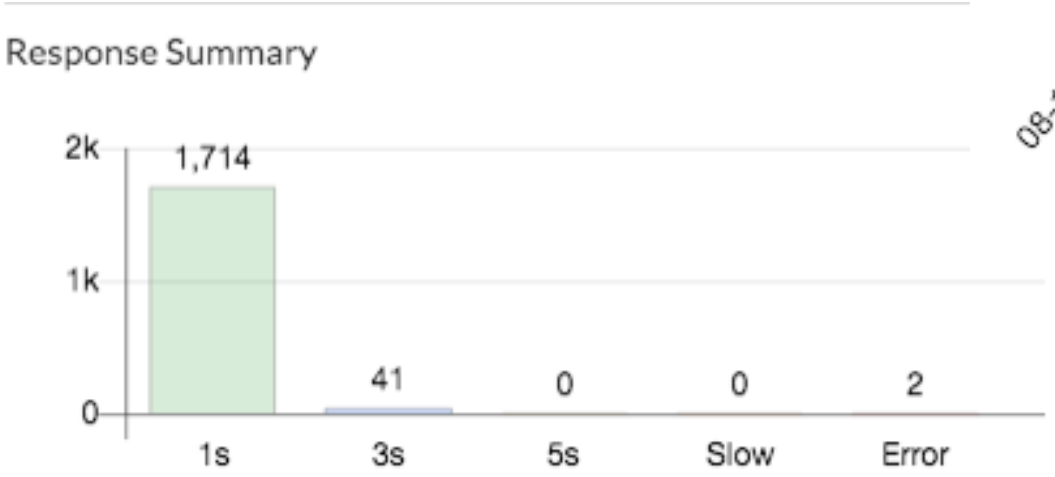
Features



Features

- Response Summary chart
- Load chart





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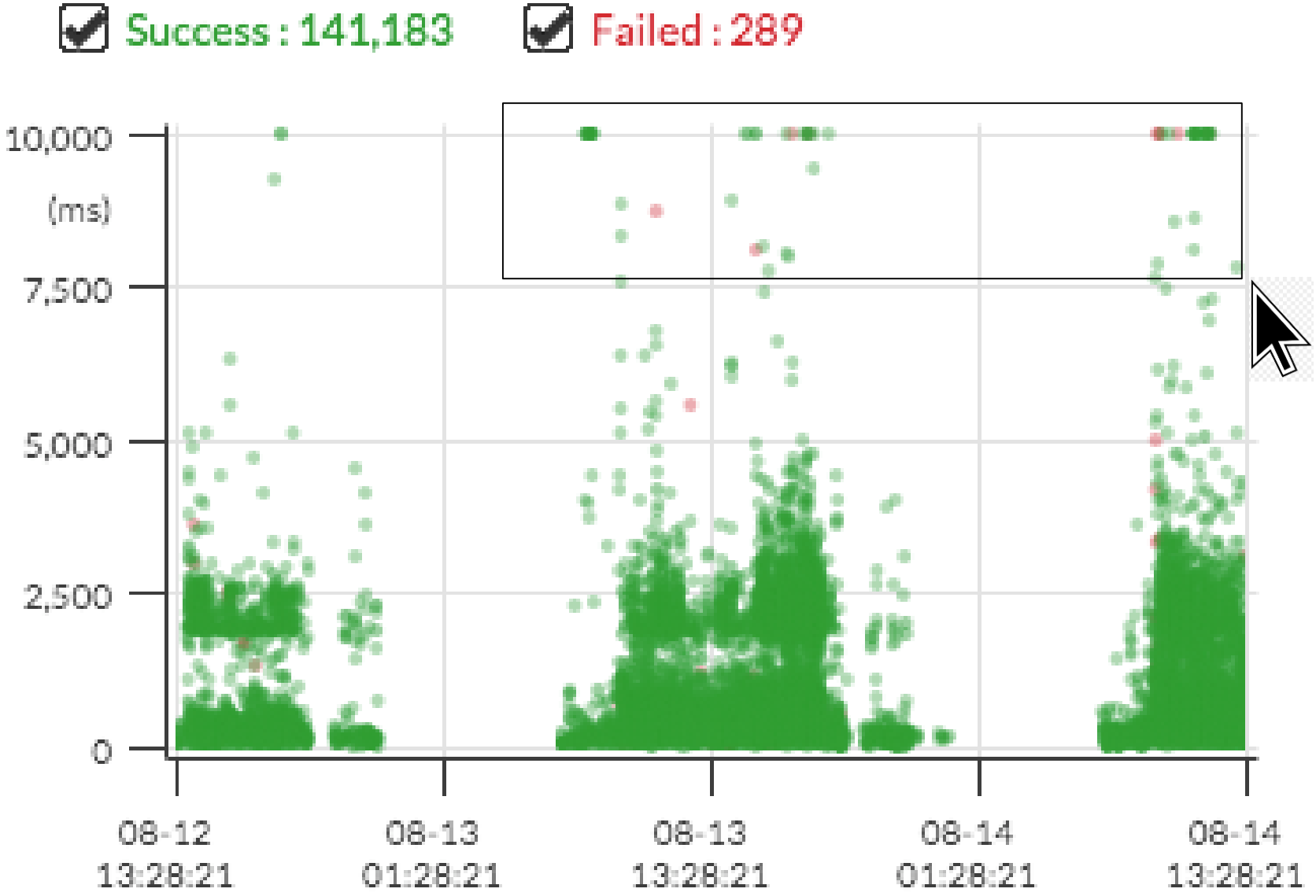
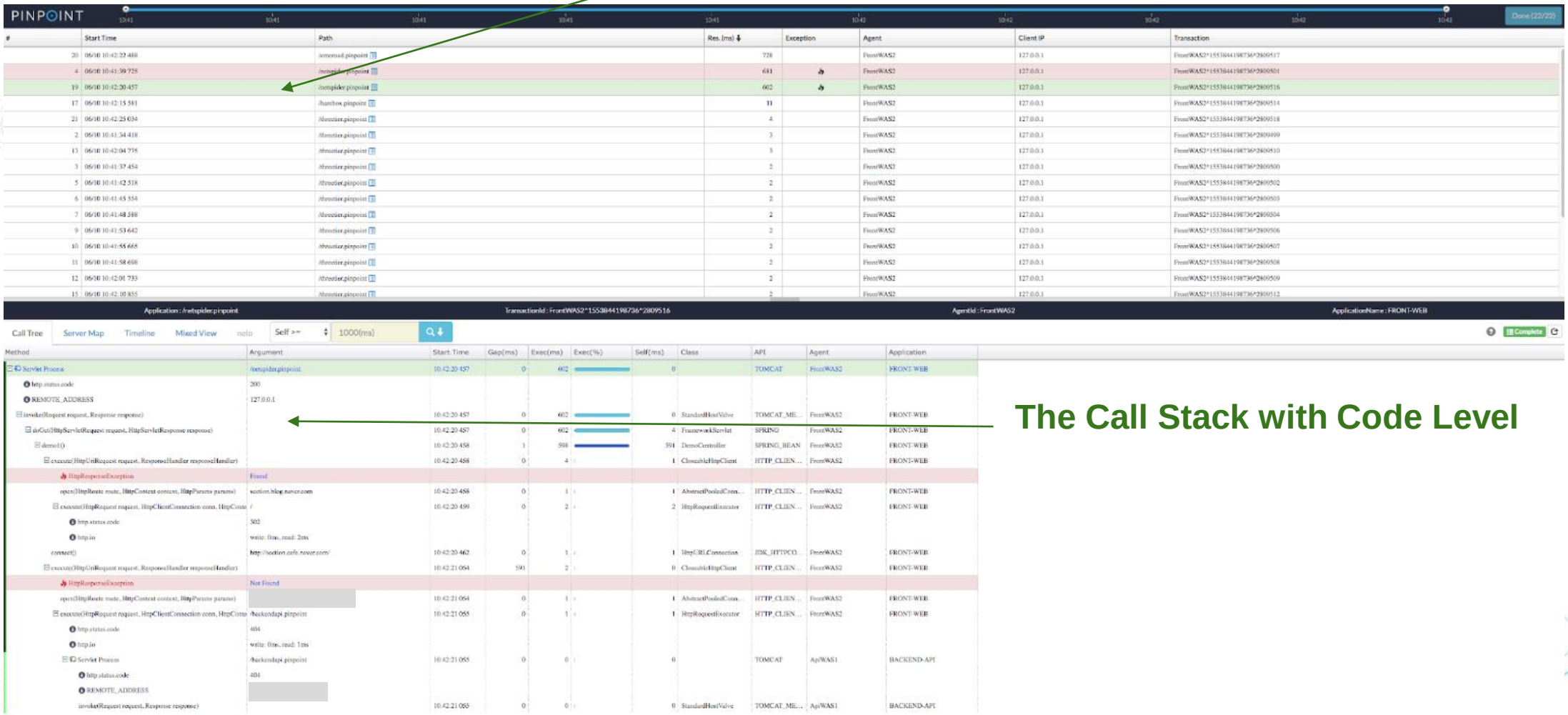

Success : 141,183
Failed : 289
10,000
(ms)
7,500
5,000
2,500
0
08-12
13:28:21
08-13
01:28:21
08-13
13:28:21
08-14
01:28:21
08-14
13:28:21

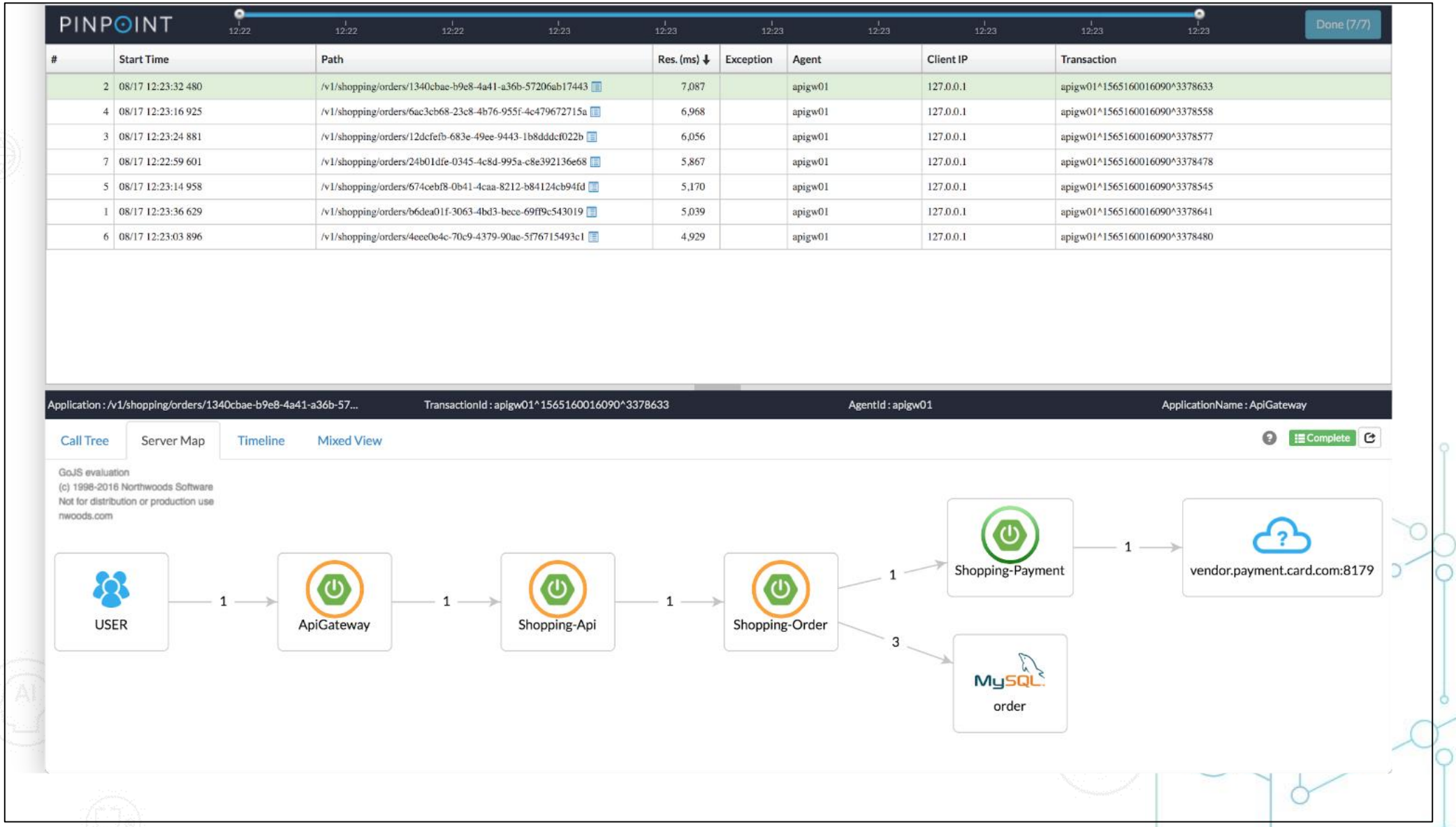
Features

List of Selected Transaction

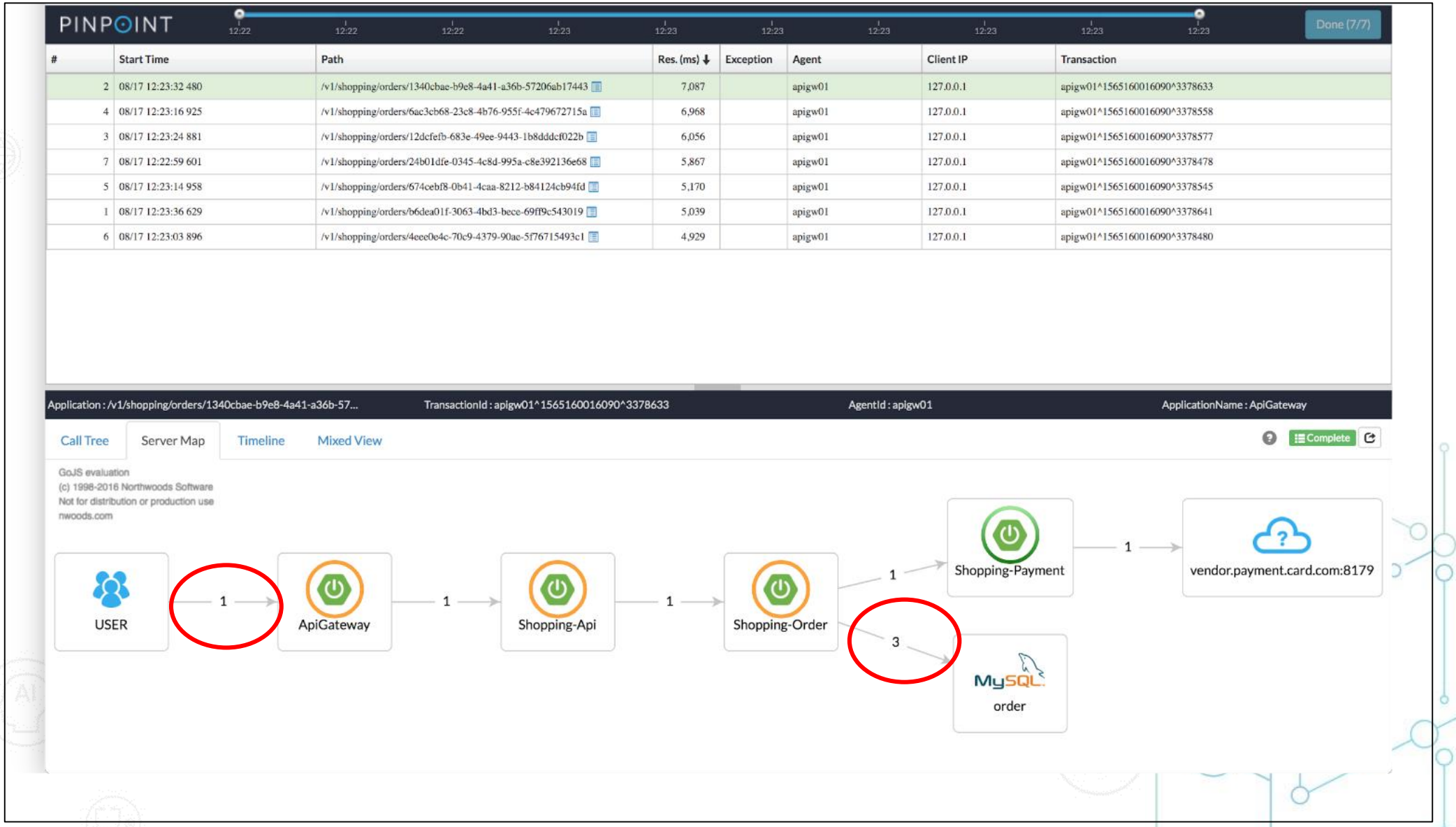


The Call Stack with Code Level

Features


PINPOINT
12:22
12:22
12:22
12:23
12:23
12:23
12:23
12:23
12:23
12:23
Done (7/7)
| Start Time | Path | Res. (ms) | Exception | Agent | Client IP | Transaction
2 | 08/17 12:23:32 480 | /v1/shopping/orders/1340cbae-b9e8-4a41-a36b-57206ab17443 | 7,087 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378633
4 | 08/17 12:23:16 925 | /v1/shopping/orders/6ac3cb68-23c8-4b76-955f-4c479672715a | 6,968 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378558
3 | 08/17 12:23:24 881 | /v1/shopping/orders/12dcfefb-683e-49ee-9443-1b8dddcf022b | 6,056 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378577
7 | 08/17 12:22:59 601 | /v1/shopping/orders/24b01dfe-0345-4c8d-995a-c8e392136e68 | 5,867 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378478
5 | 08/17 12:23:14 958 | /v1/shopping/orders/674cebf8-0b41-4caa-8212-b84124cb94fd | 5,170 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378545
1 | 08/17 12:23:36 629 | /v1/shopping/orders/b6dea01f-3063-4bd3-bece-69ff9c543019 | 5,039 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378641
6 | 08/17 12:23:03 896 | /v1/shopping/orders/4eee0e4c-70c9-4379-90ae-5f76715493c1 | 4,929 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378480
Application : /v1/shopping/orders/1340cbae-b9e8-4a41-a36b-57...
TransactionId : apigw01^1565160016090^3378633
AgentId : apigw01
ApplicationName : ApiGateway
Call Tree
Server Map
Timeline
Mixed View
Complete
GoJS evaluation
(c) 1998-2016 Northwoods Software
Not for distribution or production use
nwoods.com
USER
1
ApiGateway
1
Shopping-Api
1
Shopping-Order
1
Shopping-Payment
1
vendor.payment.card.com:8179
3
MySQL
order

Features


PINPOINT
12:22
12:22
12:22
12:23
12:23
12:23
12:23
12:23
12:23
12:23
Done (7/7)
| Start Time | Path | Res. (ms) | Exception | Agent | Client IP | Transaction
2 | 08/17 12:23:32 480 | /v1/shopping/orders/1340cbae-b9e8-4a41-a36b-57206ab17443 | 7,087 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378633
4 | 08/17 12:23:16 925 | /v1/shopping/orders/6ac3cb68-23c8-4b76-955f-4c479672715a | 6,968 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378558
3 | 08/17 12:23:24 881 | /v1/shopping/orders/12dcfefb-683e-49ee-9443-1b8dddcf022b | 6,056 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378577
7 | 08/17 12:22:59 601 | /v1/shopping/orders/24b01dfe-0345-4c8d-995a-c8e392136e68 | 5,867 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378478
5 | 08/17 12:23:14 958 | /v1/shopping/orders/674cebf8-0b41-4caa-8212-b84124cb94fd | 5,170 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378545
1 | 08/17 12:23:36 629 | /v1/shopping/orders/b6dea01f-3063-4bd3-bece-69ff9c543019 | 5,039 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378641
6 | 08/17 12:23:03 896 | /v1/shopping/orders/4eee0e4c-70c9-4379-90ae-5f76715493c1 | 4,929 | | apigw01 | 127.0.0.1 | apigw01^1565160016090^3378480
Application : /v1/shopping/orders/1340cbae-b9e8-4a41-a36b-57...
TransactionId : apigw01^1565160016090^3378633
AgentId : apigw01
ApplicationName : ApiGateway
Call Tree
Server Map
Timeline
Mixed View
Complete
GoJS evaluation
(c) 1998-2016 Northwoods Software
Not for distribution or production use
nwoods.com
USER
1
ApiGateway
1
Shopping-Api
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Shopping-Order
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Shopping-Payment
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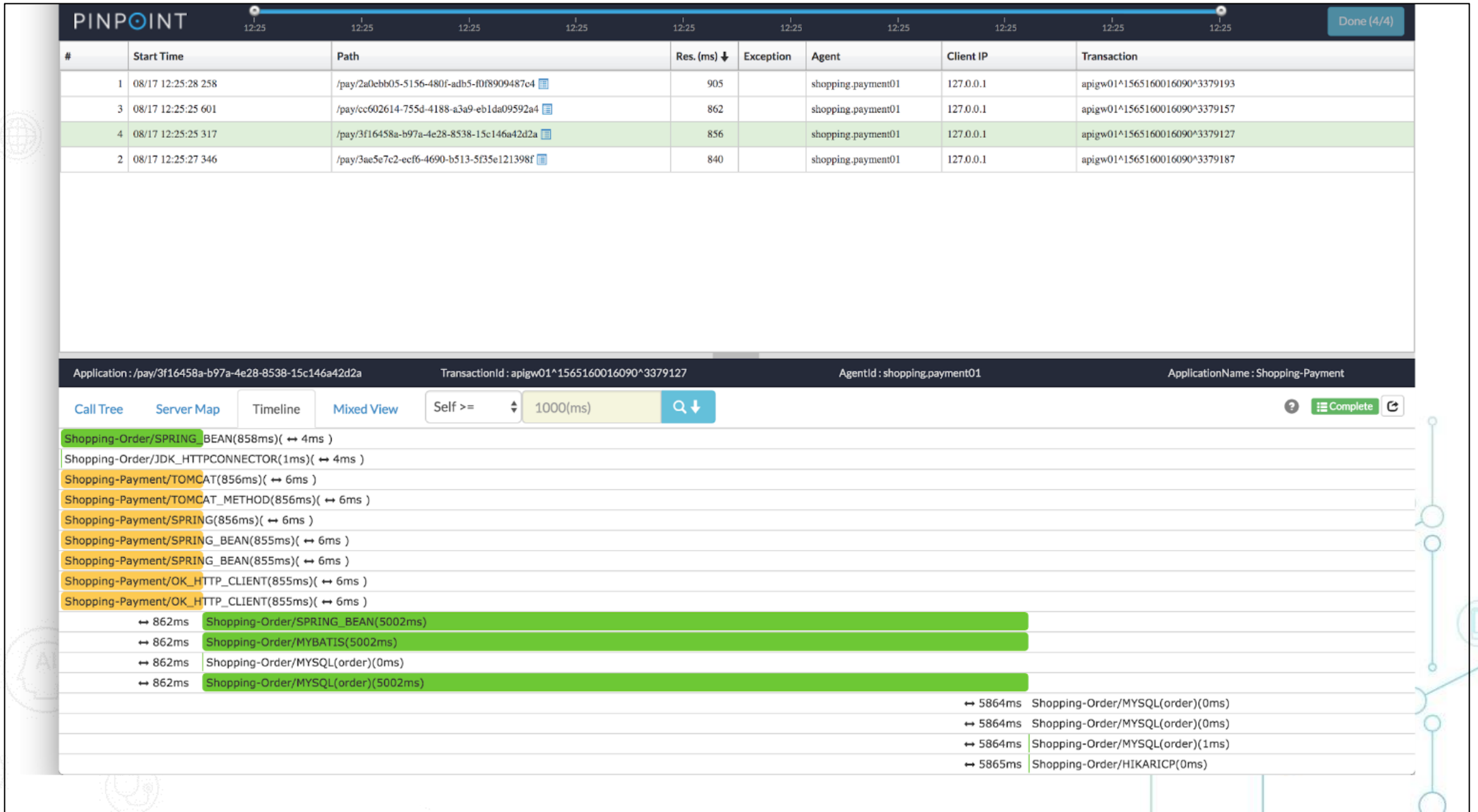
vendor.payment.card.com:8179
3
MySQL
order

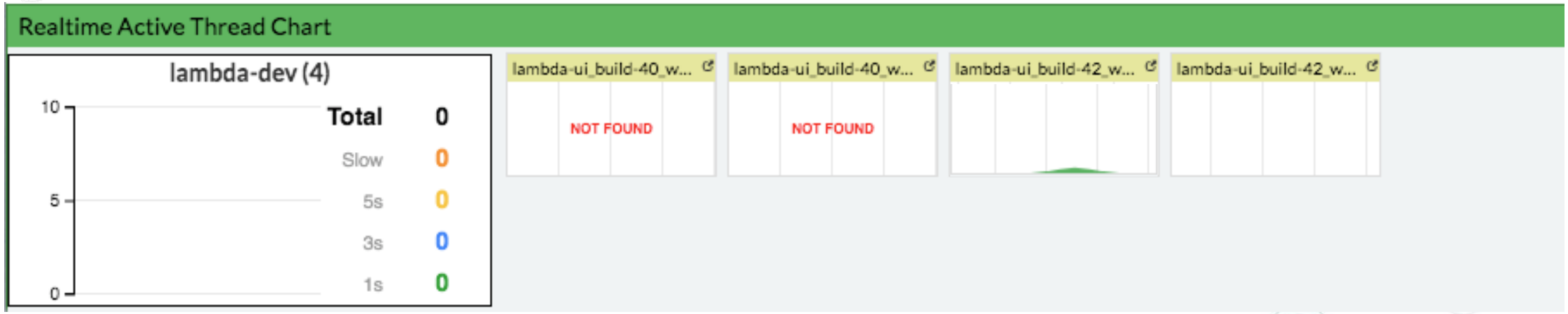
Features


PINPOINT
12:25
Done (4/4)
Start Time Path Res. (ms) Exception Agent Client IP Transaction
1 08/17 12:25:28 258 /pay/2a0ebb05-5156-480f-adb5-f0f8909487c4 905 shopping.payment01 127.0.0.1 apigw01^1565160016090^3379193
3 08/17 12:25:25 601 /pay/cc602614-755d-4188-a3a9-eb1da09592a4 862 shopping.payment01 127.0.0.1 apigw01^1565160016090^3379157
4 08/17 12:25:25 317 /pay/3f16458a-b97a-4e28-8538-15c146a42d2a 856 shopping.payment01 127.0.0.1 apigw01^1565160016090^3379127
2 08/17 12:25:27 346 /pay/3ae5e7c2-ecf6-4690-b513-5f35e121398f 840 shopping.payment01 127.0.0.1 apigw01^1565160016090^3379187
Application : /pay/3f16458a-b97a-4e28-8538-15c146a42d2a
TransactionId : apigw01^1565160016090^3379127
AgentId : shopping.payment01
ApplicationName : Shopping-Payment
Call Tree
Server Map
Timeline
Mixed View
Self >=
1000(ms)
Complete
Shopping-Order/SPRING_BEAN(858ms)(↔ 4ms)
Shopping-Order/JDK_HTTPCONNECTOR(1ms)(↔ 4ms)
Shopping-Payment/TOMCAT(856ms)(↔ 6ms)
Shopping-Payment/TOMCAT_METHOD(856ms)(↔ 6ms)
Shopping-Payment/SPRING(856ms)(↔ 6ms)
Shopping-Payment/SPRING_BEAN(855ms)(↔ 6ms)
Shopping-Payment/SPRING_BEAN(855ms)(↔ 6ms)
Shopping-Payment/OK_HTTP_CLIENT(855ms)(↔ 6ms)
Shopping-Payment/OK_HTTP_CLIENT(855ms)(↔ 6ms)
↔ 862ms Shopping-Order/SPRING_BEAN(5002ms)
↔ 862ms Shopping-Order/MYBATIS(5002ms)
↔ 862ms Shopping-Order/MYSQL(order)(0ms)
↔ 862ms Shopping-Order/MYSQL(order)(5002ms)
↔ 5864ms Shopping-Order/MYSQL(order)(0ms)
↔ 5864ms Shopping-Order/MYSQL(order)(0ms)
↔ 5864ms Shopping-Order/MYSQL(order)(1ms)
↔ 5865ms Shopping-Order/HIKARICP(0ms)

Features

Bird Eye View
Finding Slow Transactions
Distributed Tracing
DevOps
Scalable
Minimum Overload

Features



Can be used as HealthCheck

Features

PINPOINT
REAL TIME
Last 5m
20m
1h
3h
6h
12h
1d
2d
4
5,252
57
43
7
35,597
nbase
USER
All
VIEW SERVERS
Inspector
Total 7
Error 0
(ms)
10,000
7,500
5,000
2,500
0
2019.07.18 16:25:05
2019.07.18 16:26:20
2019.07.18 16:27:35
2019.07.18 16:28:50
2019.07.18 16:30:05
Success 24,746
Failed 0
Response Summary
40k
20k
0
25,374
1s
3s
5s
Slow
Error
Load
10k
5k
07.18 16:25
07.18 16:26
07.18 16:27
07.18 16:28
07.18 16:29
07.18 16:30
Realtime Active Thread Chart
Total Servers : 10
Active Only
Total
Slow
5s
3s
1s
NOT FOUND
NOT FOUND
NOT FOUND

Features

PINPOINT
REAL TIME
Last 5m
20m
1h
3h
6h
12h
1d
2d
5,252
57
43
35,597
nbase
USER
Realtime Active Thread Chart
Total Servers : 10
Active Only
NOT FOUND
NOT FOUND
NOT FOUND
VIEW SERVERS
Inspector
Total 7
Error 0
Success 24,746
Failed 0
Response Summary
25,374
Load
1s
3s
5s
Slow
Error

Features

PINPOINT
REAL TIME
Last 5m
20m
1h
3h
6h
12h
1d
2d
5,252
57
43
35,597
nbase
USER
Realtime Active Thread Chart
Total Servers : 10
Active Only
NOT FOUND
NOT FOUND
NOT FOUND
VIEW SERVERS
Inspector
Total 7
Error 0
Success 24,746
Failed 0
Response Summary
25,374
Load
1s
3s
5s
Slow
Error

Features

PINPOINT
REAL TIME
Last 5m
20m
1h
3h
6h
12h
1d
2d
5,252
57
43
35,597
nbase
USER
Realtime Active Thread Chart
Total Servers : 10
Active Only
NOT FOUND
NOT FOUND
NOT FOUND
VIEW SERVERS
Inspector
Total 7
Error 0
Success 24,746
Failed 0
Response Summary
25,374
Load
1s
3s
5s
Slow
Error

Features

PINPOINT
REAL TIME
Last 5m
20m
1h
3h
6h
12h
1d
2d
5,252
57
43
35,597
nbase
USER
Clean =
All
VIEW SERVERS
Inspector
Total 7
Error 0
10,000
7,500
5,000
2,500
2019.07.18
16:30:05
Realtime Active Thread Chart
Total Servers : 10
Active Only
NOT FOUND
NOT FOUND
NOT FOUND
Total
Slow
5s
3s
1s
Load
10k
5k
0
07.18 16:25
07.18 16:26
07.18 16:27
07.18 16:28
07.18 16:29
07.18 16:30
1s
3s
5s
Slow
Error

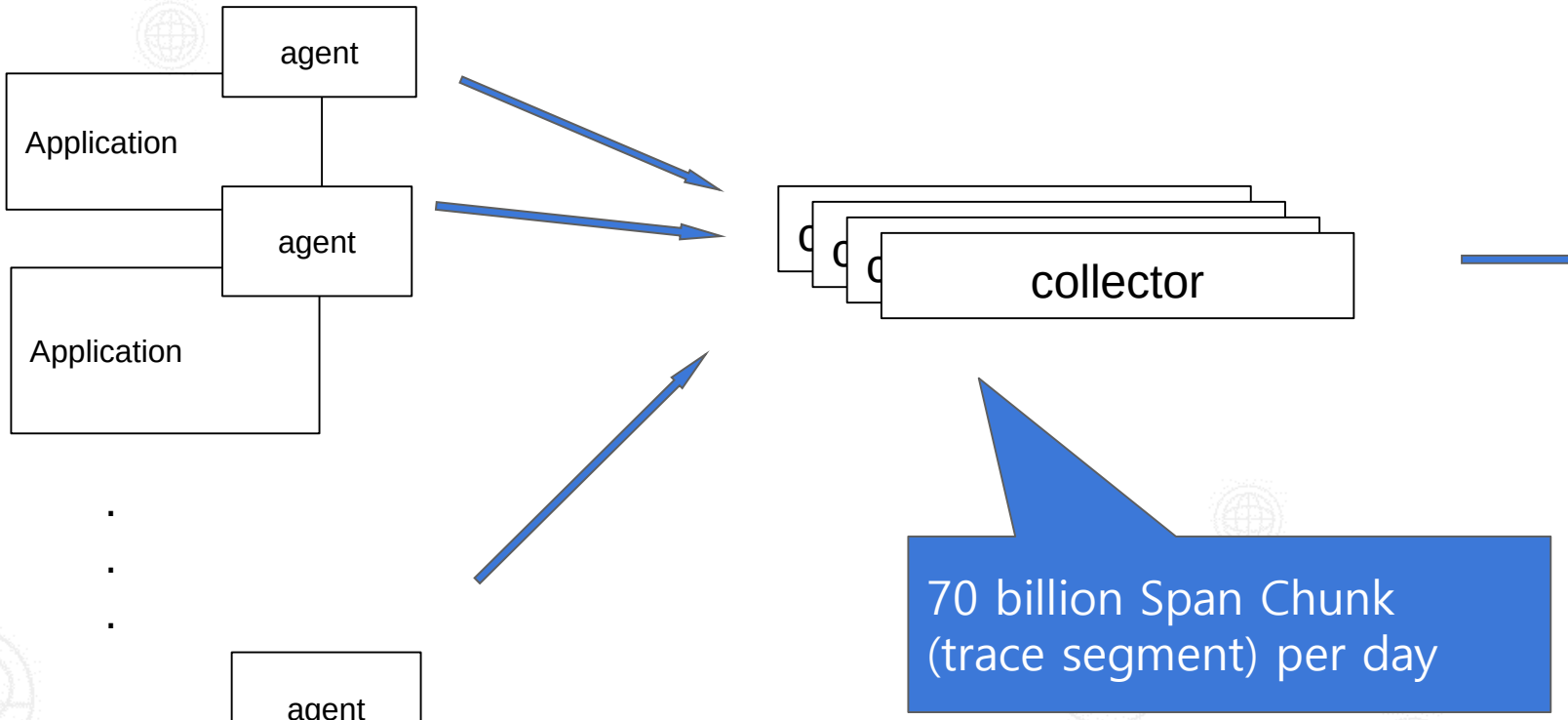
Features

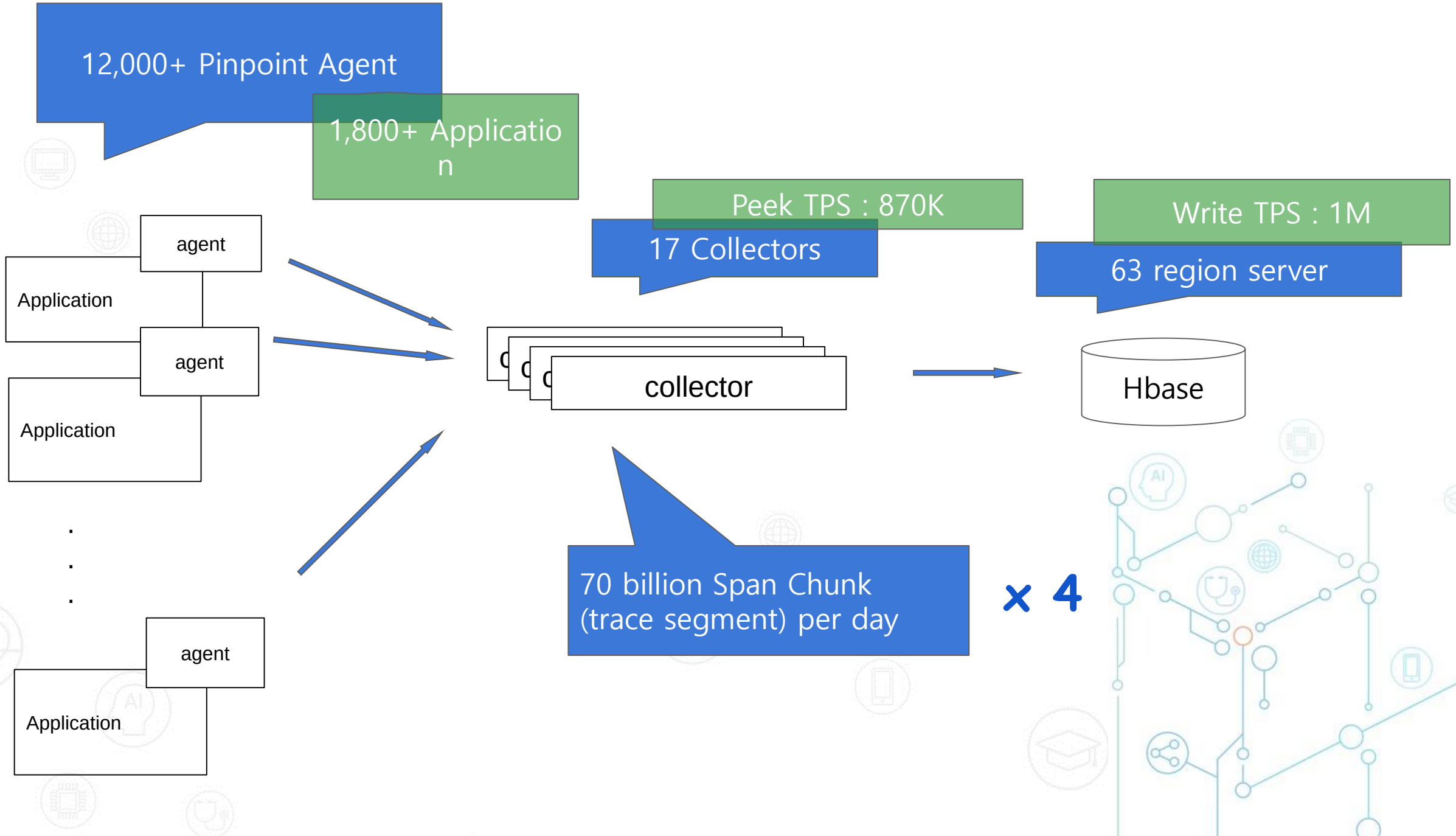
Basic Info of the Instance

- Heap, Non-Heap Memory
- JVM/SYSTEM CPU
- JVM GC
- TPS, Active Thread
- Response Time
- File Descriptor
- Direct/Mapped Buffer
- Data Source

Features

Bird Eye View
Finding Slow Transactions
Distributed Tracing
DevOps
Scalable
Minimum Overload


agent
Application
agent
Application
.
.
.
agent
Application
collector
Hbase
70 billion Span Chunk
(trace segment) per day


12,000+ Pinpoint Agent
1,800+ Application
Peek TPS : 870K
17 Collectors
Write TPS : 1M
63 region server
agent
Application
agent
Application
collector
Hbase
70 billion Span Chunk
(trace segment) per day
x 4
agent
Application

Features

PINPOINT

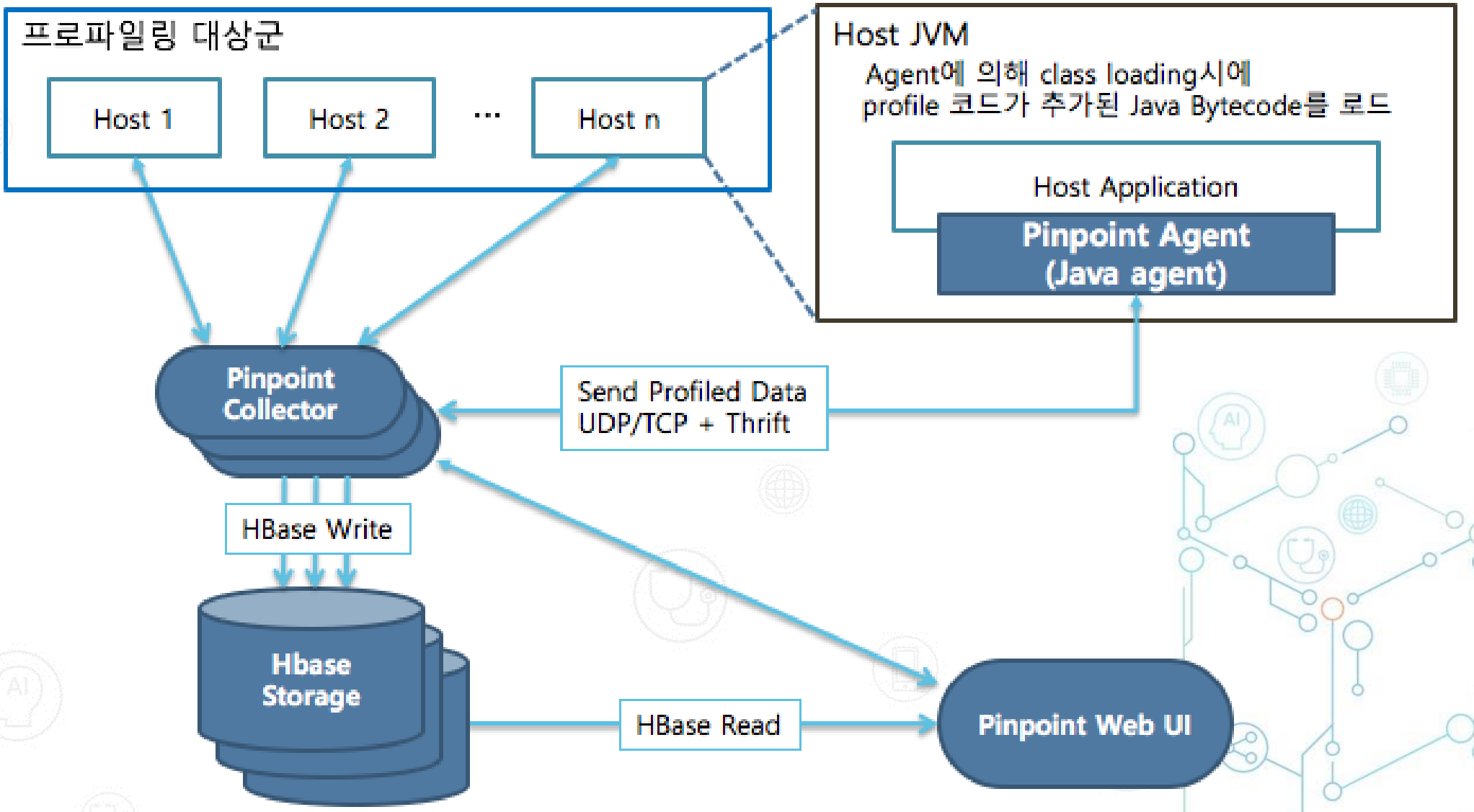
Bird Eye View
Finding Slow Transactions
Distributed Tracing
DevOps
Scalable
Minimum Overload

Features

- Execute Integration Tests Periodically
  - **Less than 3%** difference in performance
  - Sampling ‘No-Agent’, ‘5%’, ‘100%’

Tomcat Only																					
VUser 4						VUser 32						VUser 64						VUser 128					
Duration (ms)	Tests	Error	Mean Test Time (ms)	TPS	nGrinder	Duration (ms)	Tests	Error	Mean Test Time (ms)	TPS	nGrinder	Duration (ms)	Tests	Error	Mean Test Time (ms)	TPS	nGrinder	Duration (ms)	Tests	Error	Mean Test Time (ms)	TPS	nGrinder
300000	135003	0	6.87	571.92	link	300000	421252	20	17.63	1784.54	link	300000	427943	11	34.78	1828.37	link	300000	427923	0	69.95	1828.08	link
300000	125282	0	7.42	530.74	link	300000	422774	23	17.51	1791.0	link	300000	415028	7	35.84	1773.2	link	300000	424081	0	70.61	1811.98	link
300000	127462	0	7.29	539.97	link	300000	427575	21	17.34	1811.3	link	300000	428504	8	34.75	1830.7	link	300000	403144	656	72.5	1722.34	link

Architecture



Technical Detail

```
public static void main(String[] args) {

        sayHello(“Pinpoint”);
}


private void sayHello(String str){

        Pinpoint.record Timestamp
        Pinpoint.record str

        System.out.println("Hello ” + str );

        Pinpoint.record Timestamp
}
```

Installation

- javaagent: /pinpoint-agent/pinpoint-bootstrap-2.1.0.jar
- Dpinpoint.agentId=${PINPOINT_AGENT_ID}
- Dpinpoint.applicationName=${PINPOINT_APPLICATION_NAME}

"Pinpoint just magically works."
- Adrian Cole @pivotal (Zipkin leader)

" We think Pinpoint, an open source tool in this space is worth investigating as an alternative to AppDynamics and Dynatrace"
- thoughtworks.com

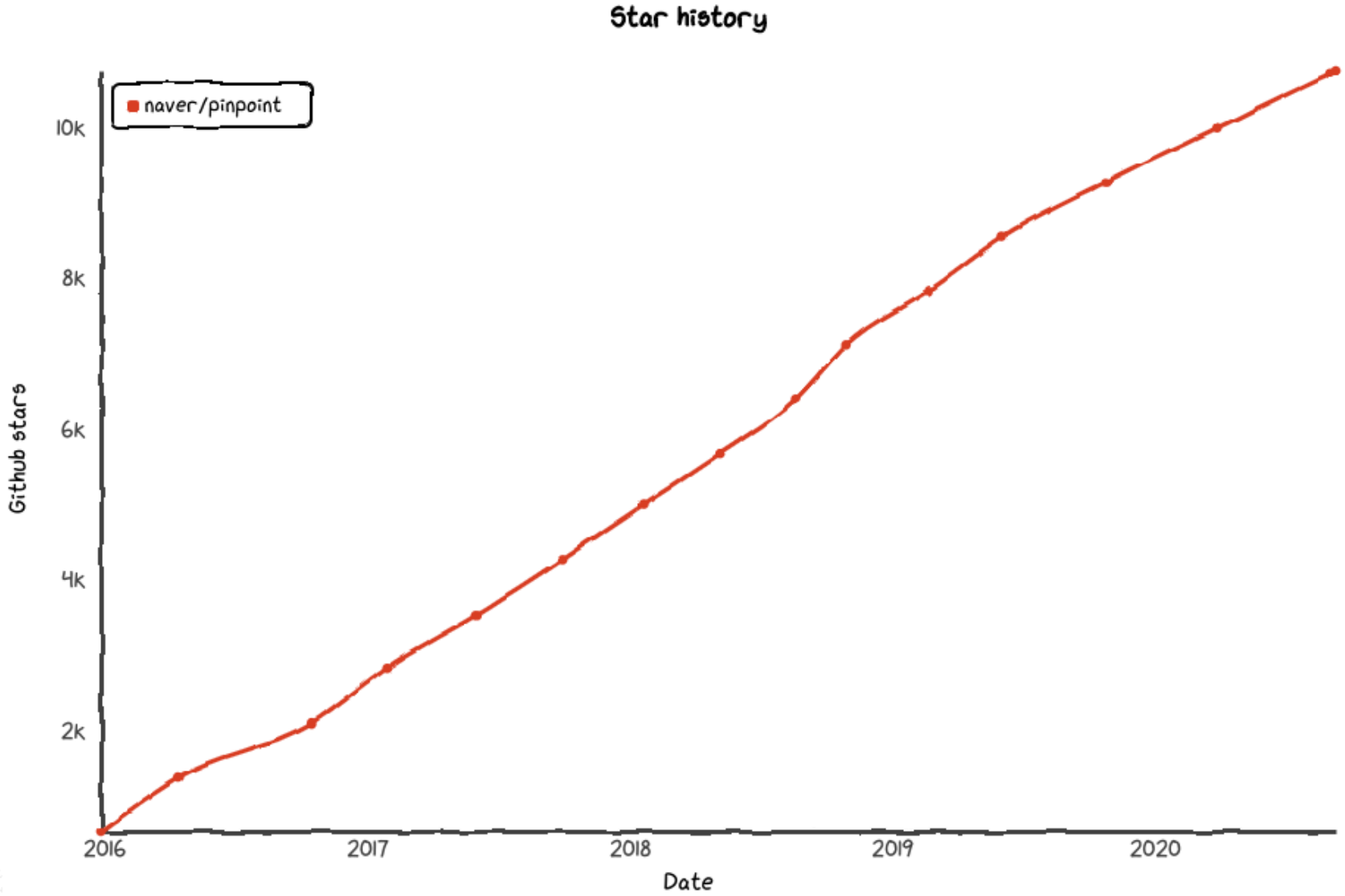
Open Source Pinpoint

Jun 17, 2012 – Sep 8, 2020

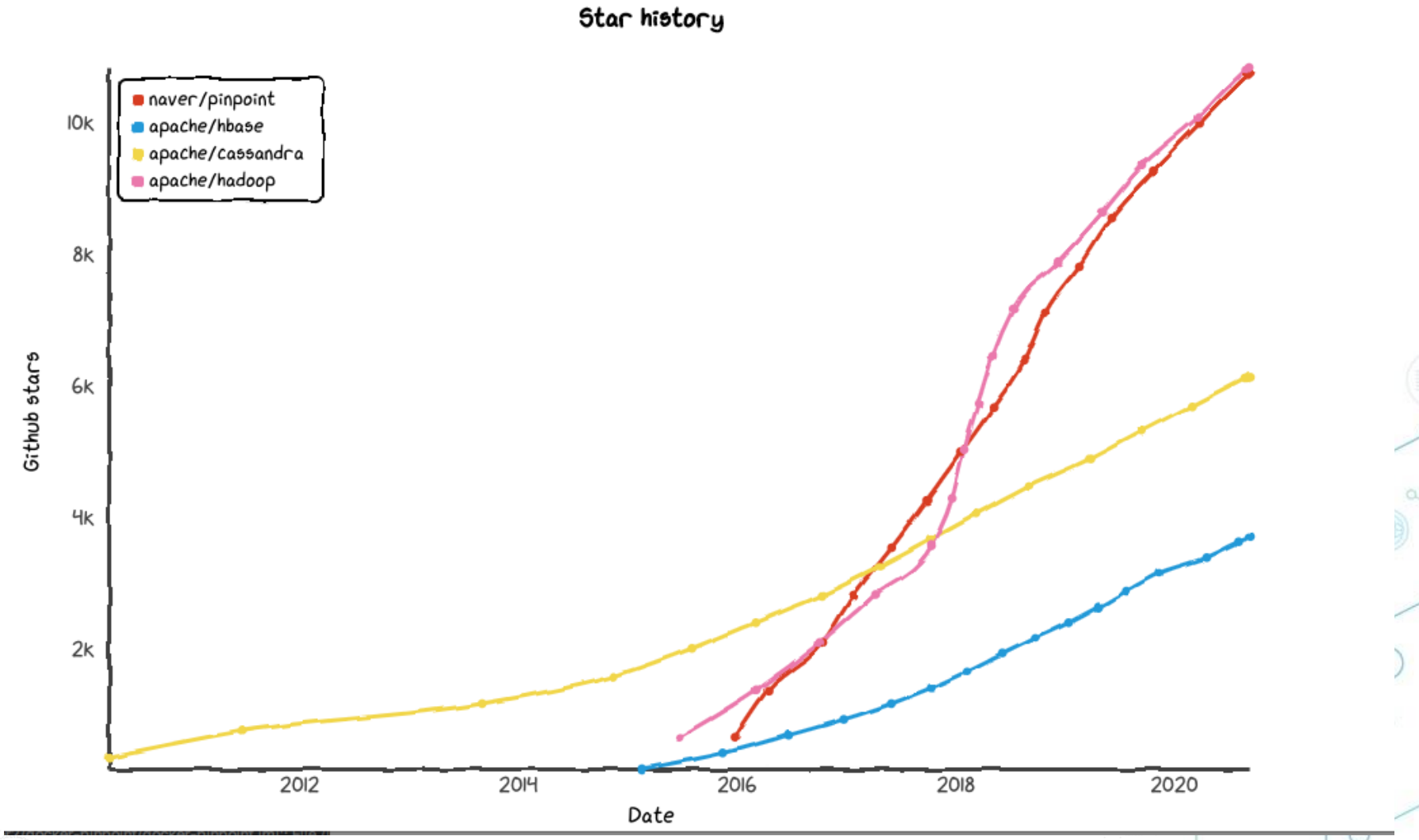
Contributions: Commits ▾

Contributions to master, excluding merge commits

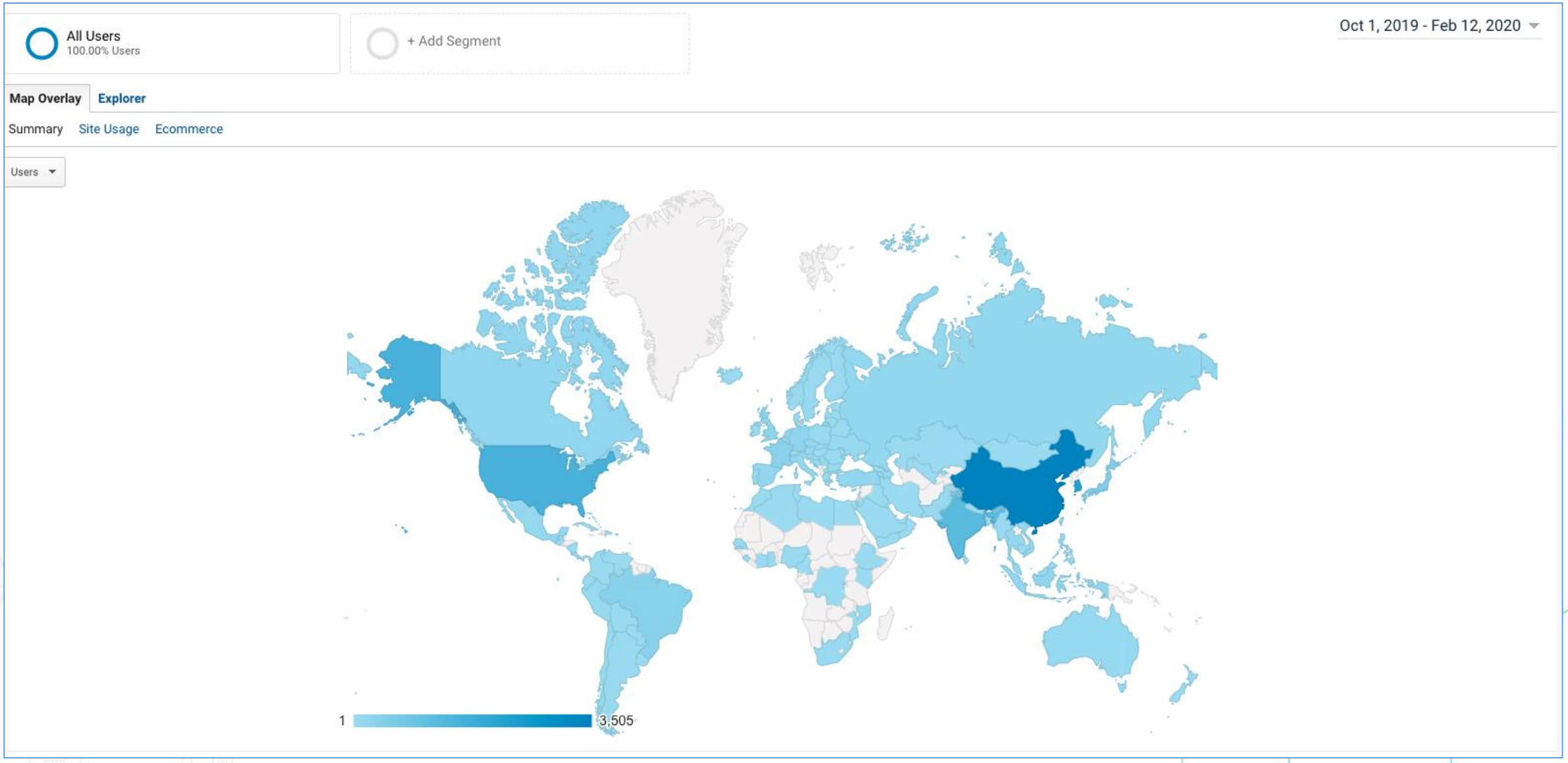
Open Source Pinpoint



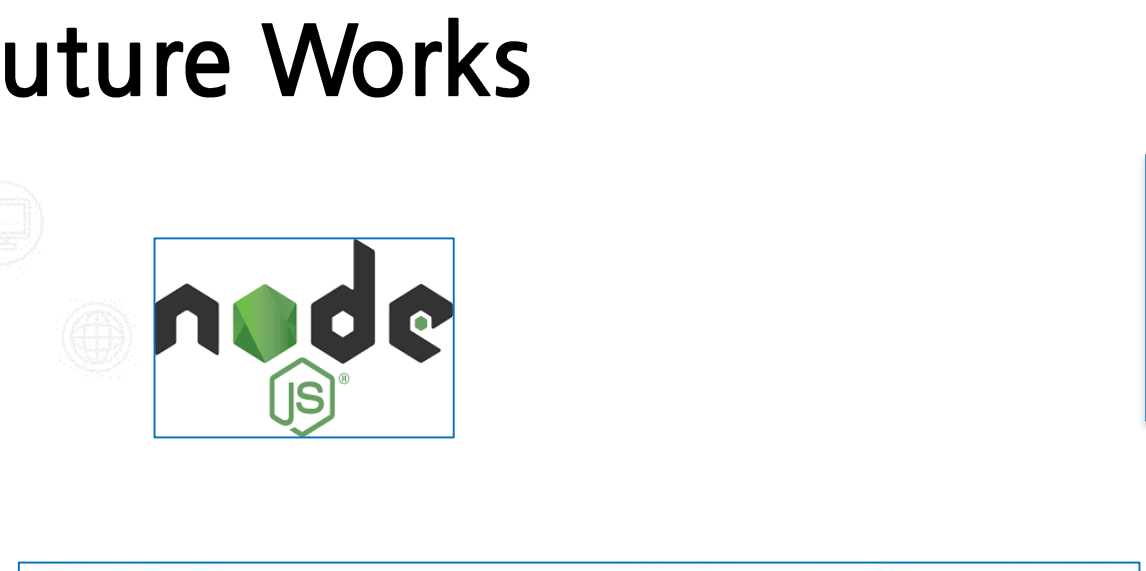
Open Source Pinpoint

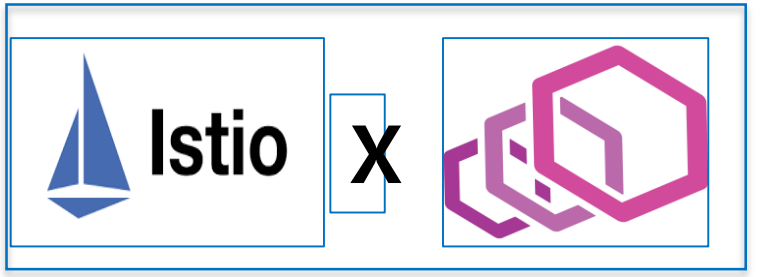


Open Source Pinpoint

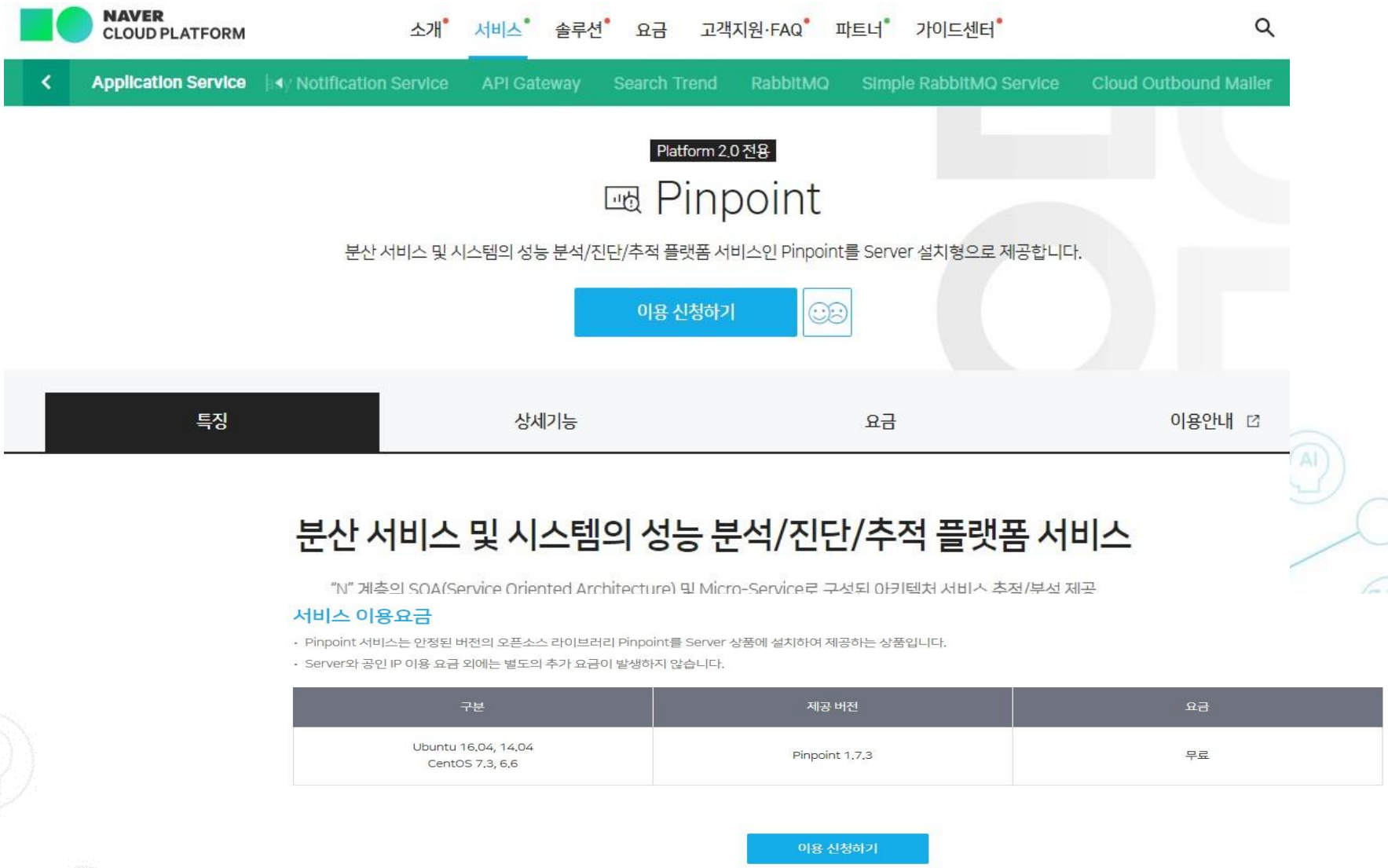


Future Works





Future Works



감사합니다

오픈소스센터