



Review open call 3 experiment: PiAS

Passenger information At Scale

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Experiment description

PASSENGER INFORMATION AT SCALE

Context

Complexity is increasing

- From audio systems to integrated distributed systems
- Reliability of the passenger information system is crucial

Audio



LED signs



TFT screens



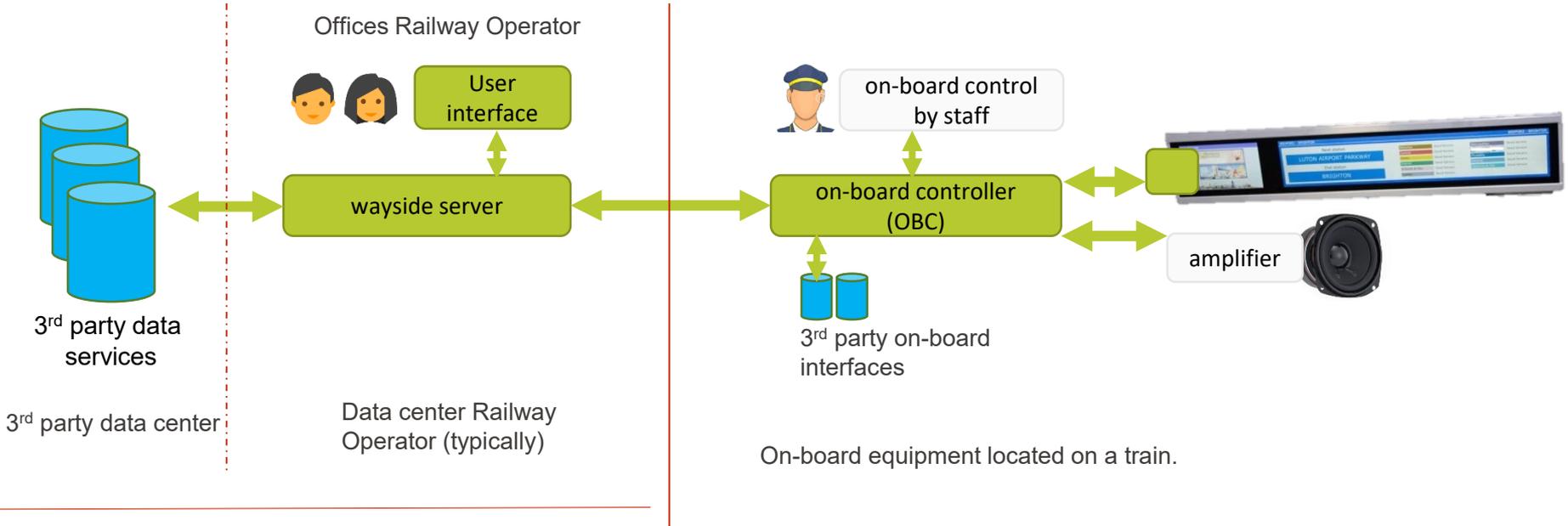
Seat reservation



Networks



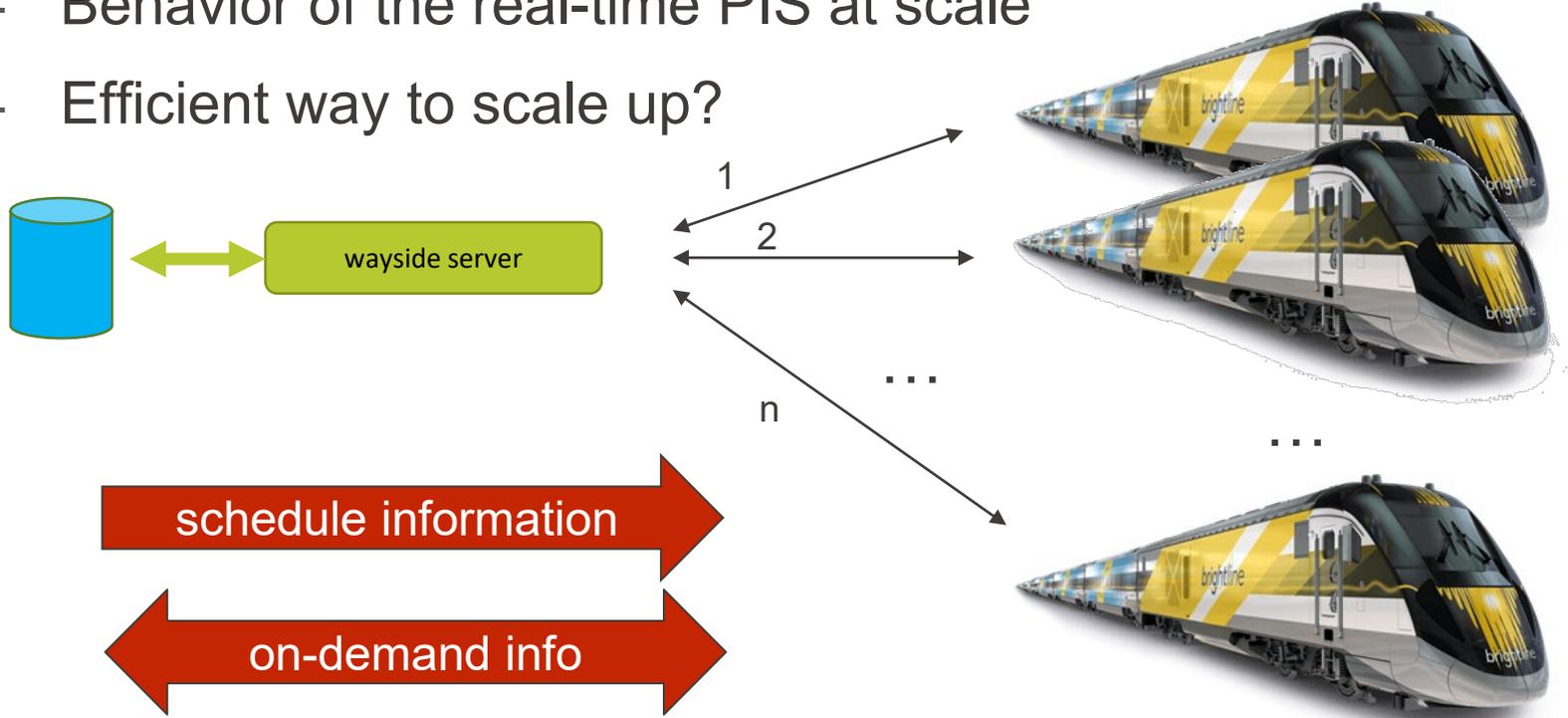
Context



"The Wayside"

Questions

- Behavior of the real-time PIS at scale
- Efficient way to scale up?





Project results

PASSENGER INFORMATION AT SCALE

At small scale

- Automated testing and reporting set-up

Feature Report

Feature	Steps						Scenarios			Features	
	Passed	Failed	Skipped	Pending	Undefined	Total	Passed	Failed	Total	Duration	Status
[IMS] Standard journey	14	0	0	0	0	14	1	0	1	2:50:910	Passed

Feature [IMS] Standard journey

Tags: @TRAPISNEXTGEN-1085
 Scenario [IMS] Start standard Darwin journey [prod/func/core] Happy Path: 2:50:910

Steps	Duration	Status
Given the test system is in an idle state	0:00:08	Passed
And test data is provided	4:818	Passed
And old datasets are removed	0:00:00	Passed
When darwin sends new datasets to the XData connectors	2:46:053	Passed
Then XData should process the datasets	0:00:00	Passed
When JIM receives the new datasets	0:00:00	Passed
Then the received datasets should be processed on trainside	0:00:00	Passed
When sending a headcode to the JIM	0:00:00	Passed

headcode
2654

Then a list of corresponding journeys should be received
 When sending journey_id "E303485" to the JIM
 Then the corresponding journey should be loaded
 Then all the stations of the journey should be present

Stations

Preston
Lostock Hall
Banbar Bridge
Pleasington
Cherry Trees
Mill Hill (Lancashire)
Blackburn
Rishton
Church & Oswaldtwistle
Accrington
Rose Grove
Burnley Central

When a doors open/closed command is sent to the JIM
 Then the train should be in the start station of the journey

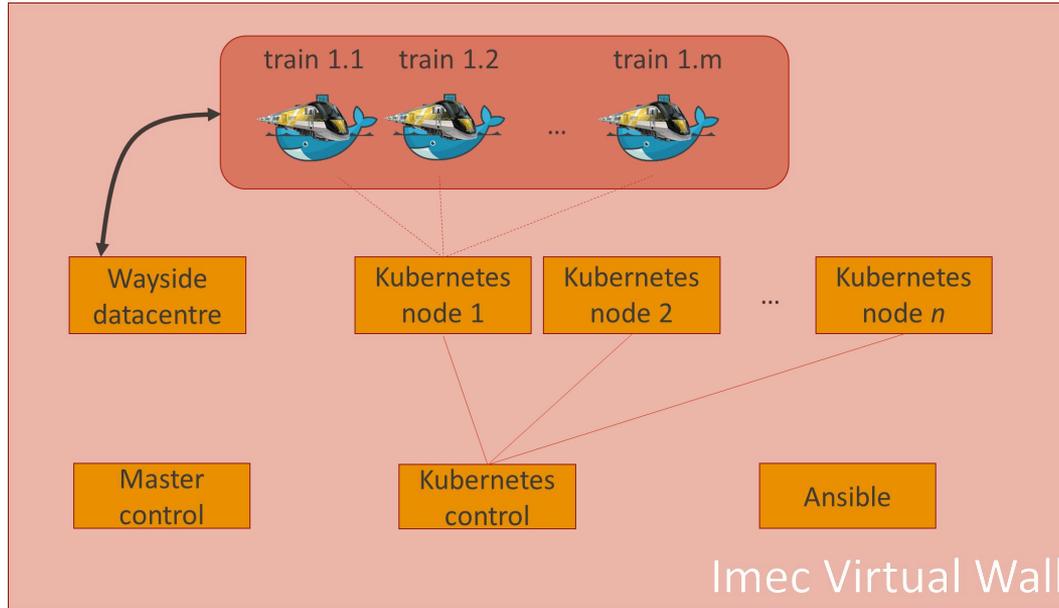
```

Run: B ETA (XData) x
Tests passed 11 of 11 tests - 24x151ms

Test Results
  [IMS/RTD] ETA
    [prod/func/core] Happy path
      Given the test system is in an idle state
      Given test data is provided
      When the test-system is ready
      When sending a Darwin RTD ETA message
      Then the eta and etd of every stop in the list should be updated
      [prod/func/core] Unreliable platform
      Given the test-system is in an idle state
      Given test data is provided
      Given the test-system is ready
      When sending a Darwin RTD ETA message where "ROSG" has an unr
      Then the eta and etd of every stop in the list should be updated
      Then should the platform for "ROSG" set to unreliable

2018-09-26 08:57:59,753 message_queue_handler.py get_latest_train_status_message [DEBUG ] 98: GET: http://10.0.99.227:80/message_queue/realtime/trainstatus/latest
2018-09-26 08:57:59,766 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station ERST_3C
2018-09-26 08:57:59,767 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station LSTH_2
2018-09-26 08:57:59,767 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station BMRBRDG_2
2018-09-26 08:57:59,767 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station FLSNGTN_1
2018-09-26 08:57:59,767 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station CHR1_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station MRL6_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station BMR1_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station RISHTON_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station CHOS_2
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station ACRNGTN_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station ROSG_1
2018-09-26 08:57:59,769 IMS-RTD ETA.py | step_impl [INFO ] 66: Verify station BURNLEY_C1
  
```

At larger scale



jFed

At larger scale

- Wayside server of the newest generation of our passenger information solution has the capability to support large fleets
- Even under stress conditions (e.g. «all trains starting at the same time») a standard server is capable of supporting an entire fleet



Business impact

PASSENGER INFORMATION AT SCALE

Business impact



Direct impact

Functional tests at smaller and larger scale – detecting potential issues and improving performance at scale before deployment in the field.

```
[ 14:44:00,969] [MQ connection] [INFO] (MessageQueueConnection.java:82) - Trying to open connection to tcp://192.168.1.1:61616 with client ID JIM:abbe6b64-7e0a-4d8c-9c26-469ffab5a46a ...
[ 14:44:00,977] [main] [INFO] (JimApp.java:267) - Starting JIM main app: Done!
[ 14:44:00,996] [main] [INFO] (Updater.java:99) - Starting dataset update handler...
[ 14:44:01,229] [main] [INFO] (MessageQueueSubscriber.java:105) - Starting subscriber for TOPIC livecom.snapshot.*
[ 14:44:01,229] [main] [WARN] (MessageQueueSubscriber.java:114) - Can't create subscriber, no active session
[ 14:44:01,230] [main] [INFO] (MessageQueueSubscriber.java:105) - Starting subscriber for TOPIC xdata.static.*
[ 14:44:01,230] [main] [WARN] (MessageQueueSubscriber.java:114) - Can't create subscriber, no active session
[ 14:44:01,232] [main] [INFO] (Updater.java:104) - Starting dataset update handler: Done!
[ 14:44:01,282] [MQ connection] [INFO] (MessageQueueConnection.java:100) - Successfully connected to tcp://192.168.1.1:61616 with client ID JIM:abbe6b64-7e0a-4d8c-9c26-469ffab5a46a
[ 14:44:01,284] [MQ connection] [INFO] (MessageQueuePublisher.java:83) - Starting publisher for TOPIC jim.vehicle.position
[ 14:44:01,294] [MQ connection] [INFO] (MessageQueueSubscriber.java:105) - Starting subscriber for VIRTUAL_TOPIC xdata.realtime.train
[ 14:44:01,308] [MQ connection] [INFO] (MessageQueueRequestReply.java:104) - Starting publisher for request-reply to TOPIC jim.realtime.request
```

Business impact



Impact: methodologies

- Large-scale automated testing requires an adjusted strategy for provisioning tests / executing test scripts / processing results
- Mixed approach Docker/Kubernetes clearly also usable in future testing



kubernetes



Business impact



Impact: convincing customers more easily

- Fleet scales are expected to increase in the future; testing at scales before deployment proves the viability of a solution
- Large-scale controlled tests in actual rail environments are almost impossible to organize

Business impact

Impact: collaborating on innovation

- History of collaborating with research partners
- Helps us to learn new technologies, meet new possible partners, inspires new ideas for the future
 - E.g. use of Kubernetes for automated scaling, Ansible for deployment etc.



Feedback

PASSENGER INFORMATION AT SCALE

The open call mechanism

- Relatively low threshold, good incentive for exploring the federation
- Great to see that “single infrastructure” use was accepted by the reviewers
- Maybe the duration of the experiments could become somewhat longer (without necessarily increasing the budget) as a buffer



The tooling / availability

- jFed/Virtual wall easy to use, quick to set up initial experiments
- For more advanced usage, help of the testbed owner was crucial
- Very good support from testbed owner (e.g. new Debian image)
- Testbed was always available when needed

Value of knowledge



Testing strategy used at scale suggested by testbed owner – very relevant knowledge

Knowledge on large-scale testing (built by years-long expertise, amongst others by building/maintaining Fed4FIRE infrastructures) likely undervalued in the Fed4FIRE value proposition



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WWW.FED4FIRE.EU