Making use of the REST api's around me…

CCdug - May 13th 2024

Toine Michielse, Solutions Architect

toine.michielse@broadcom.com

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Agenda

- Introduction
- Architecture
- Three use cases

Let me quickly introduce myself (Toine)

- Toine Michielse, born in The Netherlands
  - Db2 programmer, DBA,
    System Engineer, Architect
- Many years as Db2 for z/OS Lab Advocate
- Before joining Broadcom in Madrid
  - Mainframe architect at SwissRe
  - Leading Cap/Performance mgmt. team
  - Leading Db2 Consultancy team

My passions:

Db2, data,
mainframe modernization

Paragliding

Playing drums with “Ciencia Urbana”
(see Spotify
…if you like rock)

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Introduction

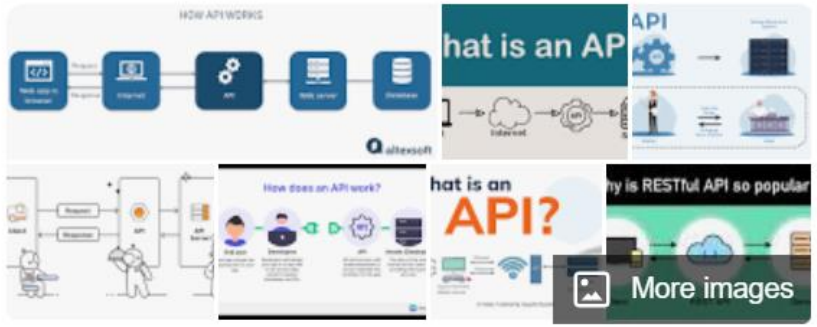
APIs are at the heart of platform integration

- Application programming interface
- Cross product / cross platform
- Communication protocol
- Popular industry standard
- Recently adopted by mainframe vendors

OPEN MAINFRAME PROJECT Zowe CONFORMANT
API MEDIATION LAYER - ZOWE V2

Application programming interface

Type of software



An application programming interface is a way for two or more computer programs or components to communicate with each other. It is a type of software interface, offering a service to other pieces of software. Wikipedia

Not necessarily "open source" but a relevant building block

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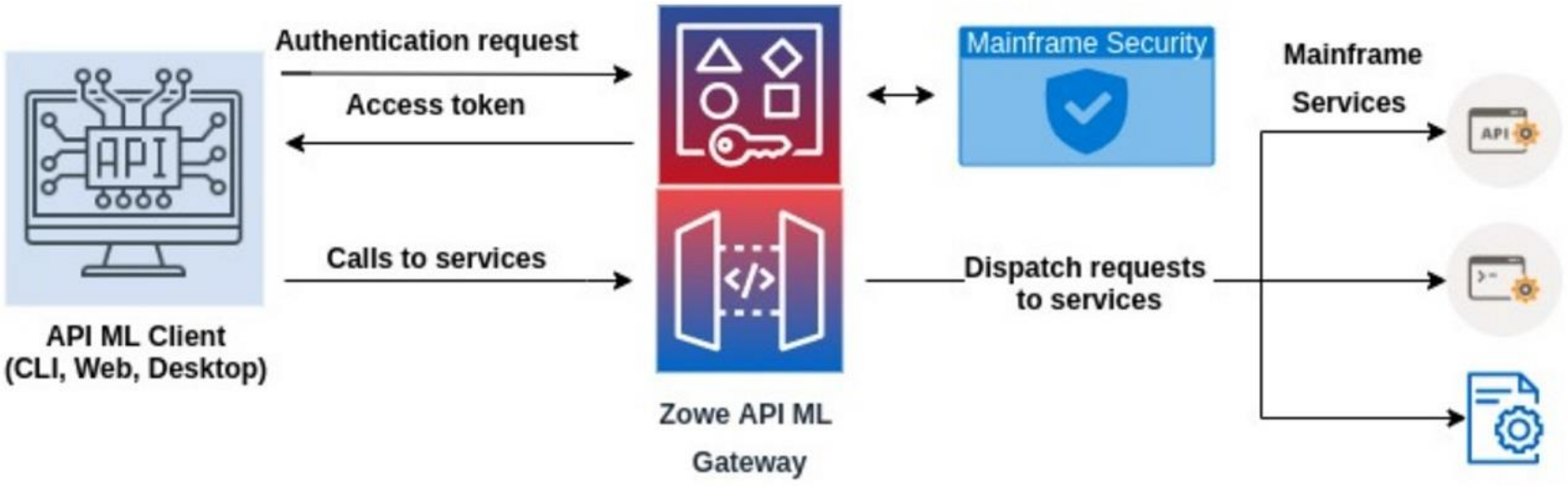
The API Mediation Layer is Critical

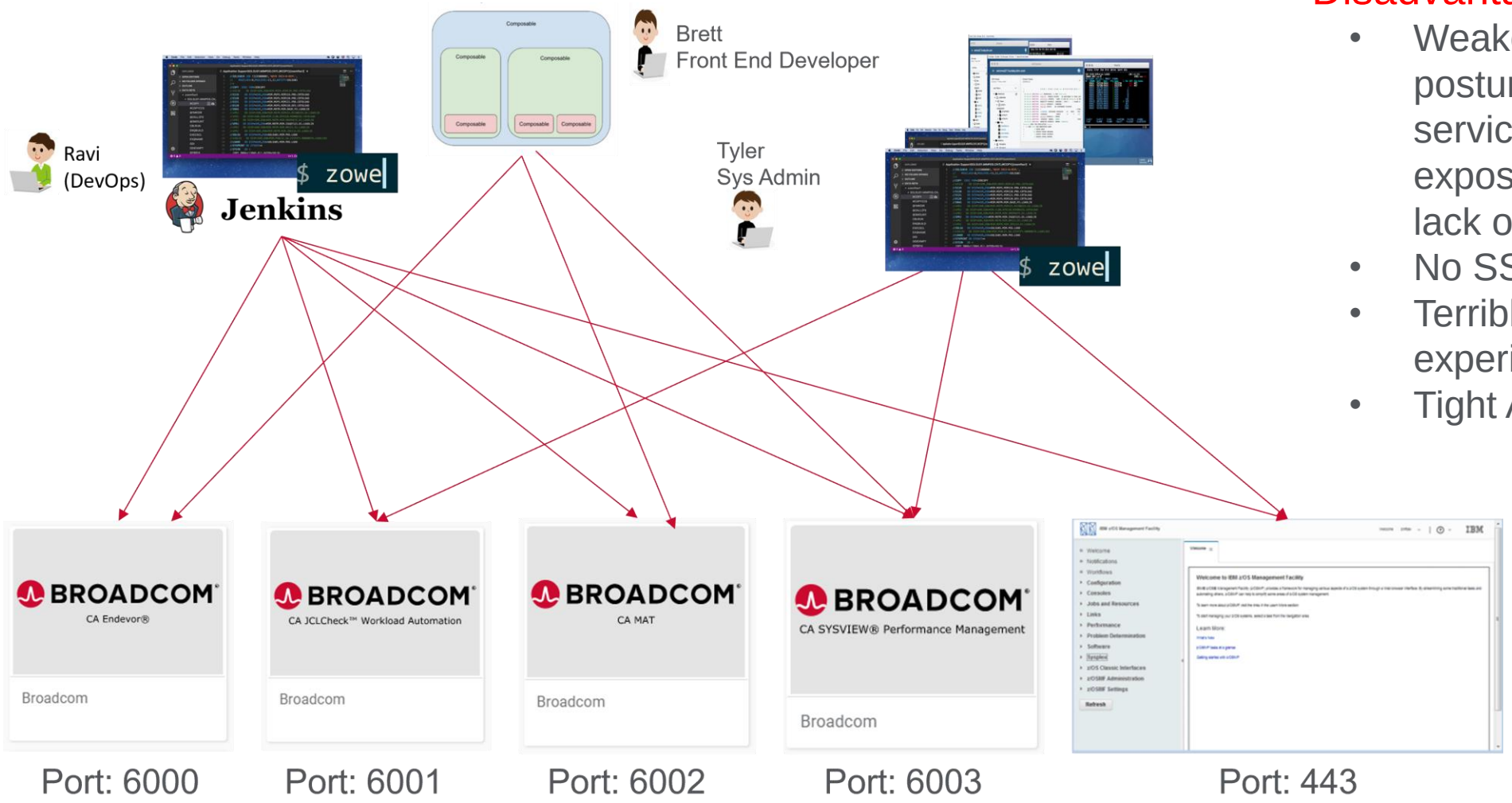
- Strengthens security posture
- Addresses a set of essential cross-cutting API concerns, including
  - ✓ Enhanced security, usability, discoverability, and resiliency
  - ✓ Improved availability, scalability, and manageability
- Superior and simpler user experience for API consumers

There are no viable alternatives to address these concerns



API Landscape *without* API Mediation Layer

Imagine this at scale! Not for the faint of heart…



Disadvantages:

- Weaker security posture: each API service needs its own exposed port and URL; lack of observability
- No SSO support
- Terrible API user experience
- Tight API/client coupling

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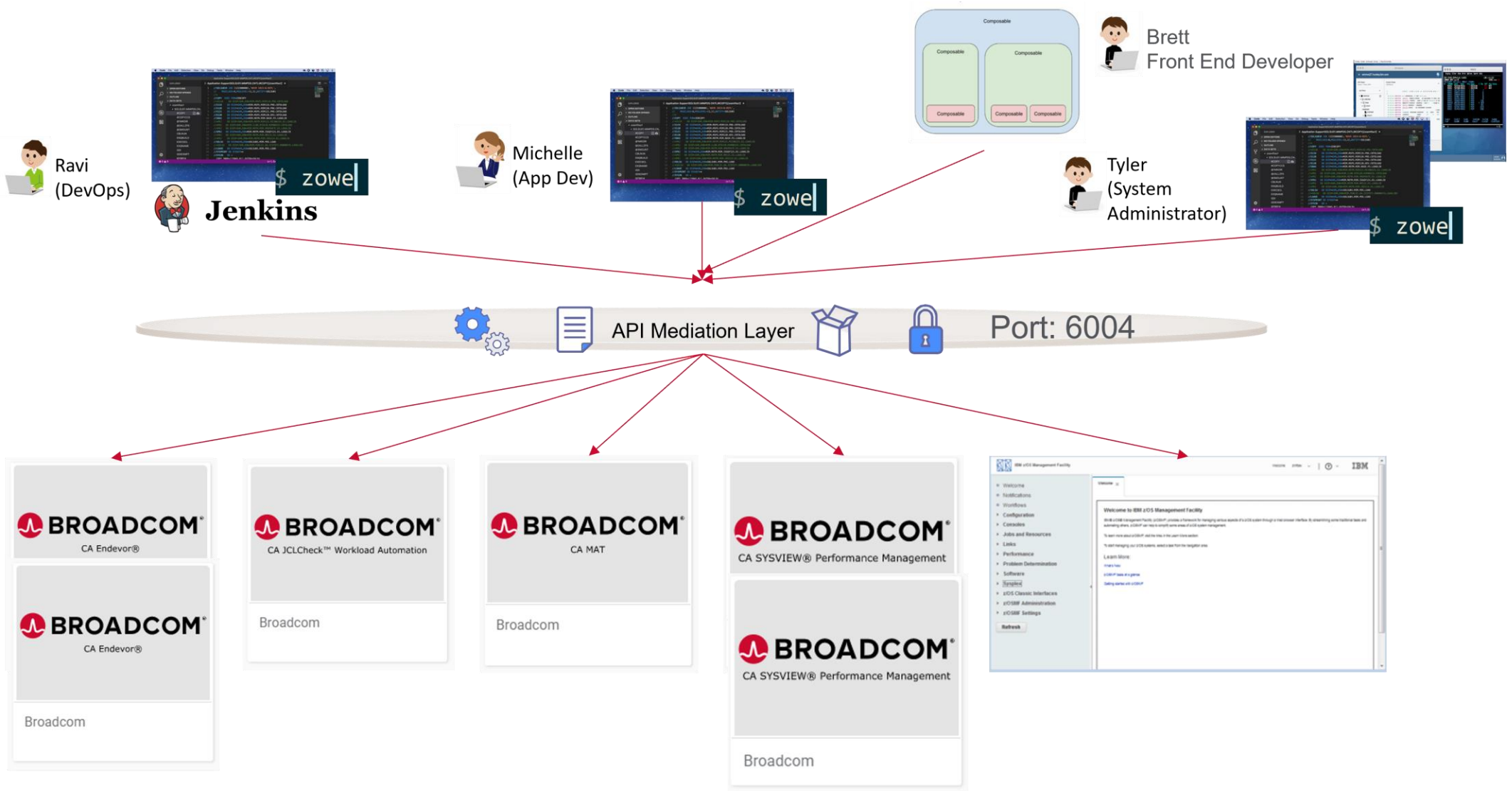
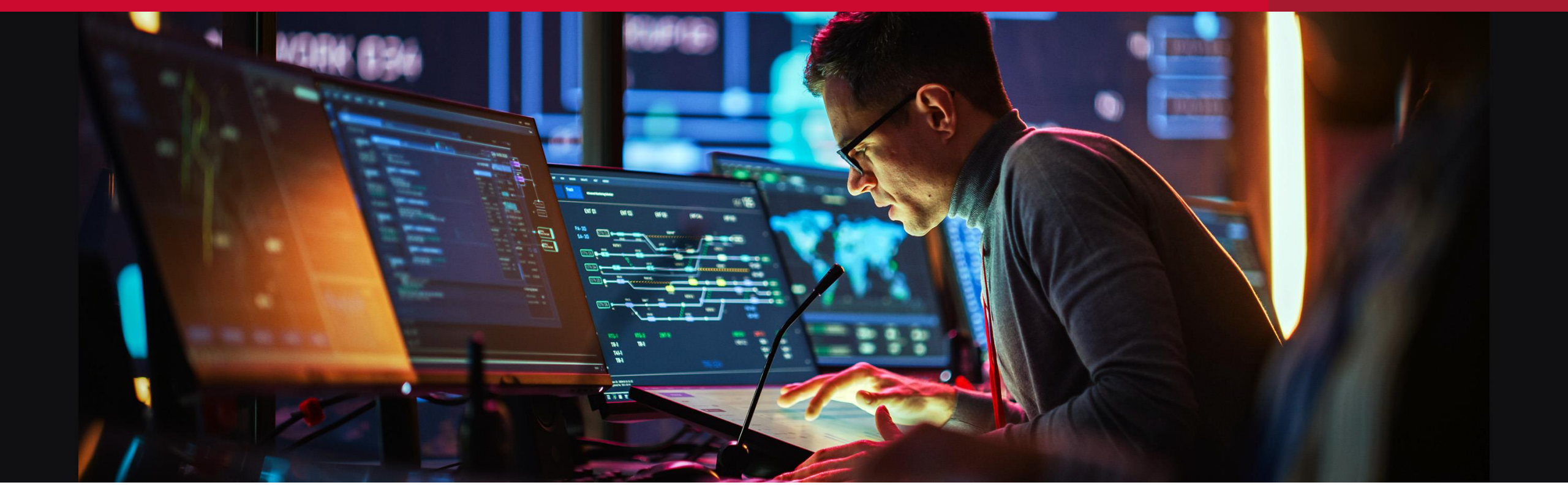
API landscape *with* API Mediation Layer





Let’s look at what we can build with existing Broadcom APIs to modernize the way we work with the mainframe

Use Case #1:

Performance Monitoring

Db2 for z/OS systems need to be monitor for trends and exceptional situations

REST API exposes performance metrics

Time series database collects data for analysis

- Invokes the API at regular intervals
- Query language enables deep analysis

Dashboard provides visualization of the performance metrics

- Provides user customizable graphic displays
- Generates alerts based on user defined thresholds

Operations/DBA uses dashboards to monitor and analyze performance

Using open source

- Prometheus is an open-source component
  - A time series database and alerting engine

- Grafana is an open-source software
  - Provides powerful data visualization for analytics and monitoring
  - Supports various data sources
  - Allows creating, exploring, and sharing dashboards
  - Integrates well with Prometheus time-series database

Compliant versus non-compliant

Prometheus format (compliant)

Request URL

```
https:/[redacted]3/dbm/api/v1/idb2/prometheus/generic?function=DSAISTD&delta=true&ssid=D121
```

Server response

Code	Details
200	Response body

```
# HELP YEAR N/A
# TYPE YEAR gauge
YEAR{ssid="D121",group="D120",function="DSAISTD"} 2024.0
# HELP MONTH N/A
# TYPE MONTH gauge
MONTH{ssid="D121",group="D120",function="DSAISTD"} 2.0
# HELP DAY N/A
# TYPE DAY gauge
DAY{ssid="D121",group="D120",function="DSAISTD"} 13.0
# HELP HOUR N/A
# TYPE HOUR gauge
HOUR{ssid="D121",group="D120",function="DSAISTD"} 3.0
# HELP MSTR_TCB N/A
# TYPE MSTR_TCB gauge
MSTR_TCB{ssid="D121",group="D120",function="DSAISTD"} 0.038055
# HELP MSTR_SRB N/A
# TYPE MSTR_SRB gauge
MSTR_SRB{ssid="D121",group="D120",function="DSAISTD"} 0.004139
# HELP MSTR_SRB_PREEMPT N/A
# TYPE MSTR_SRB_PREEMPT gauge
MSTR_SRB_PREEMPT{ssid="D121",group="D120",function="DSAISTD"} 0.006368
# HELP MSTR_ZIIP N/A
# TYPE MSTR_ZIIP gauge
MSTR_ZIIP{ssid="D121",group="D120",function="DSAISTD"} 0.001051
# HELP MSTR_IO_INTERRUPT N/A
# TYPE MSTR_IO_INTERRUPT gauge
MSTR_IO_INTERRUPT{ssid="D121",group="D120",function="DSAISTD"} 3.63E-4
# HELP DBM1_TCB N/A
```

Response headers

Regular JSON format (non-compliant)

Request URL

```
https://[redacted]9/api/v1/journals/IDMS
```

Server response

Code	Details
200	Response body


```
[
  {
    "journalName": "J1JRNL",
    "currentSegmentNumber": 21,
    "lowRelativeBlockNumber": 10,
    "highRelativeBlockNumber": 5000,
    "currentRelativeBlockNumber": 2298,
    "dsegRelativeBlockNumber": 5020,
    "dsegInterval": 0,
    "runUnitLevel": 3,
    "runUnitsWaitingRecoveryCount": 0,
    "offloadStatus": "",
    "contentStatus": "",
    "currentStatus": "ACTIVE"
  },
  {
    "journalName": "J2JRNL",
    "currentSegmentNumber": 0,
    "lowRelativeBlockNumber": 0,
    "highRelativeBlockNumber": 0,
    "currentRelativeBlockNumber": 0,
```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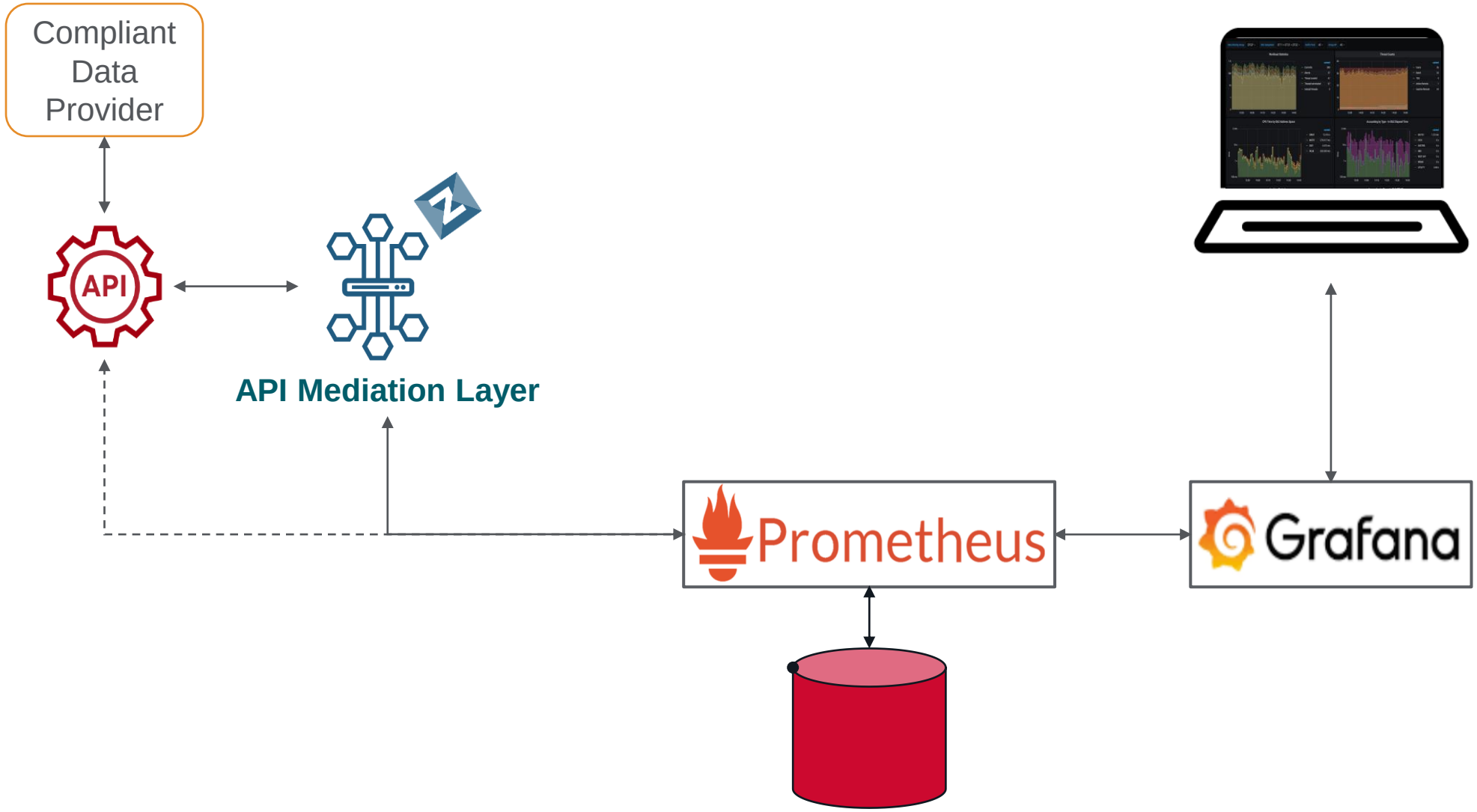
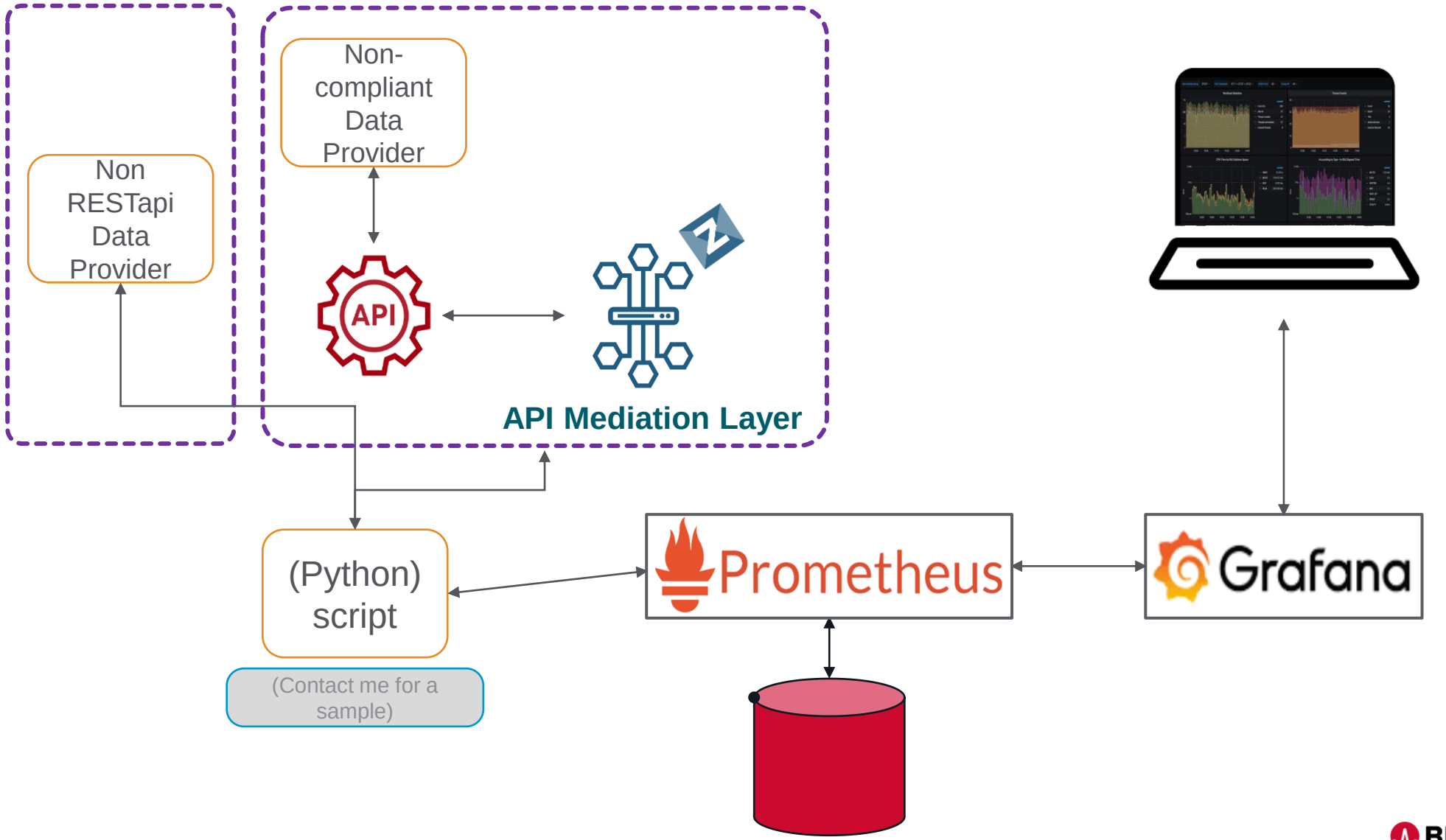
Pure pull model



Using push to Prometheus model



Increased demands, fewer resources, shorter on-ramps

Need for speed

- Problem resolution turnaround time, quick detection
- Problem avoidance

Need to “shift left”

- Free up time of the scarce, highly skilled resources
- Empower more users

Need for context

- Time (when an activity happened) and Persona (who is in the driver’s seat)

Dashboarding helps….

Need for speed

Need to “shift left”

Need for context

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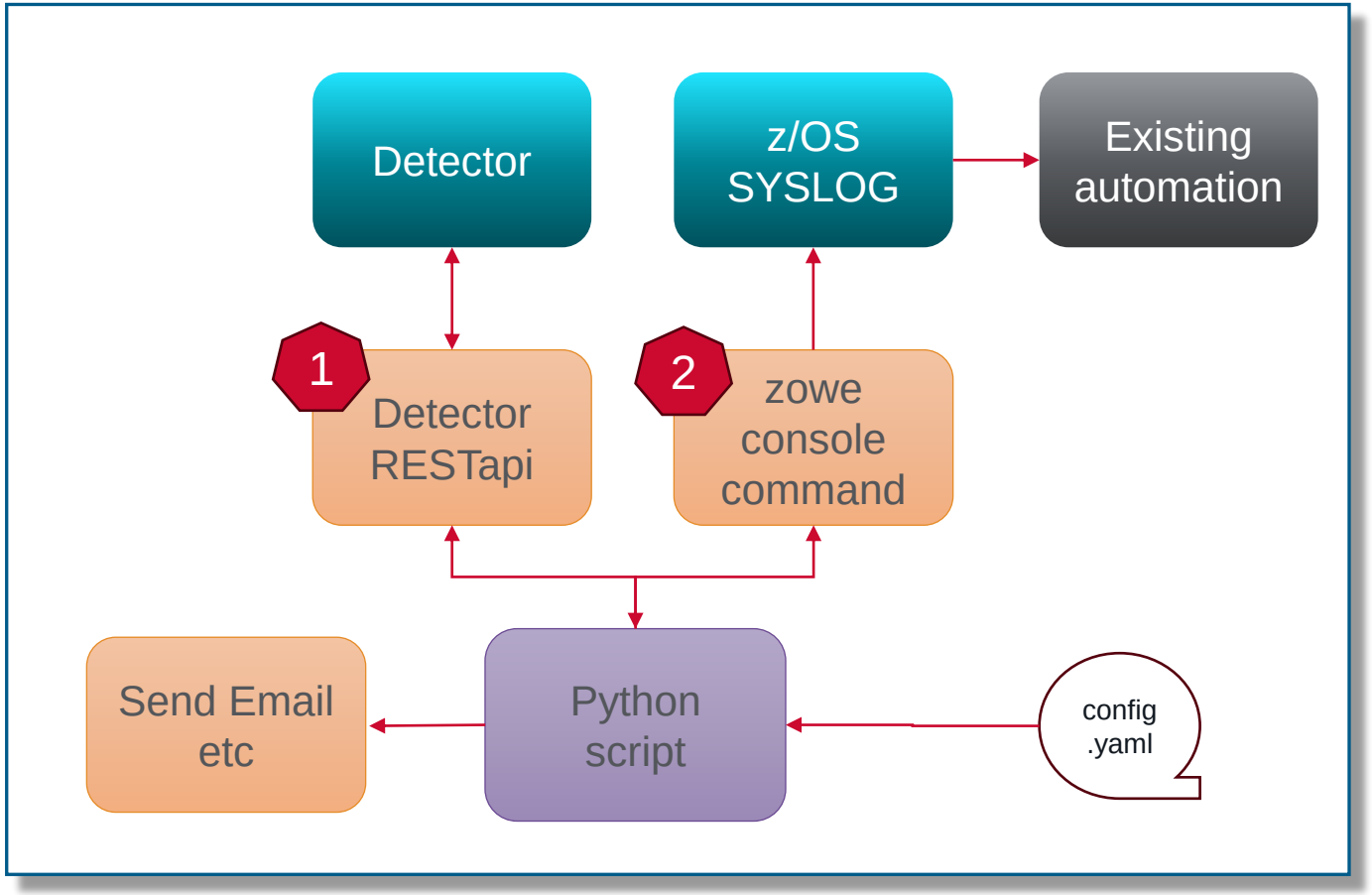
Use Case #2:

Augmenting product capabilities

- Customer was looking to trigger automation/actions when certain SQL codes appear
  - Integrate best of two platforms (Linux and Mainframe)
  - The answer: RESTapi
- Detector is excellent SQL statement level monitor
  - Performance
  - SQL codes

Use case 2: augmenting capabilities

- Implementation:
  - Python scripts polls Detector at predefined intervals
  - To trigger existing automation
    - Issue a z/OS SEND command
  - Implement other action triggers



Augmenting capabilities: code snippets

```
import json
import urllib

base_uri="https://<your host>"
base_path="dbm/api/v1/pdt"
api_port="<your port"
credentials="xxxx" (base64 encoded for basic authentication)


def get_endpoint(endpoint,parms):
    url = "{}:{}/{}/{}?{}".format(base_uri, api_port, base_path, endpoint,parms)
    request = urllib.request.Request(url, headers={'Authorization' : 'Basic ' + credentials})
    response = json.loads(urllib.request.urlopen(request, timeout=30, context=context).read())
    return response
```

2

```
import json
import subprocess

def action_wto(wtoMsg):
    cmd = "\"SE 'RESTapi Demo SQLcodeMonitor: {}',OPERATOR=11\"".format(wtoMsg)
    zowe_output_str = subprocess.check_output(
        ['zowe', 'zos-console', 'issue', 'command', cmd,
         '--zosmf-profile','SVW.zosmf','--response-format-json'])
    zowe_output = json.loads(zowe_output_str)  # parse the json response

    if not zowe_output["success"]:
        print("Console command failed!")
        print(str(zowe_output["stderr"]))
        exit(1)
    print("\n\t A wto has been issued")
    return
```

```
import getpass
import base64

user = input("Userid: ")
pswd = getpass.getpass('Password: ')

credentials = base64.b64encode("{}:{}".format(user,
pswd).encode('ascii')).decode('ascii')
print("credential:",credentials
```

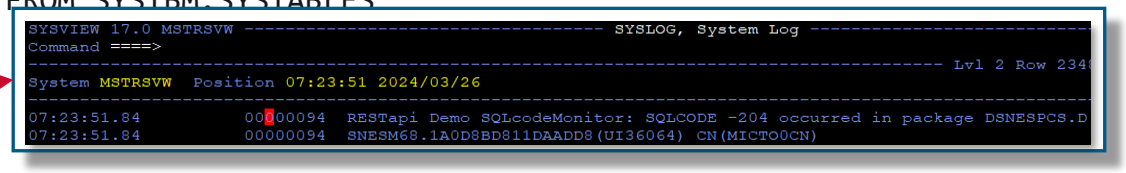
Augmenting capabilities: sample output

```
SQLcode monitor started
   Monitor interval: 30
   Generate SQL    : True
   Config file     : sqlMonitorConfig.yml

Checking for sqlcodes at 2024-03-26 16:57:30
  New instances of sqlcode -950
                Error text:
                       SQLCODE = -950, ERROR: THE LOCATION NAME SPECIFIED IN THE CONNECT STATEMENT IS
                       INVALID OR NOT LISTED IN THE COMMUNICATIONS DATABASE
                SQL text:
                       SELECT NAME,CREATOR FROM DB2DOESNOTEXIST.SYSIBM.SYSTABLES

  New instances of sqlcode -206
         An email has been sent to dba@broadcom.com
                subject: SQLCODE -206 occured, take action
                body:    Time 2024-03-26 11:12:55;
                         Connection TSO; Corrid MICTO01; Authid MICTO01, Plan DSNESPCS;
                         Package DSNESPCS.DSNESM68.1A0D8BD811DAADD8(UI36064)
                Error text:
                       SQLCODE = -206, ERROR: GEKKECOLUMN IS NOT VALID IN THE CONTEXT WHERE IT IS USED
                SQL text:
                       SELECT GEKKECOLUMN FROM SYSIBM.SYSTABLES

  New instances of sqlcode -204
         A wto has been issued
```



Use Case #3:

Productivity boost for IDMS operations

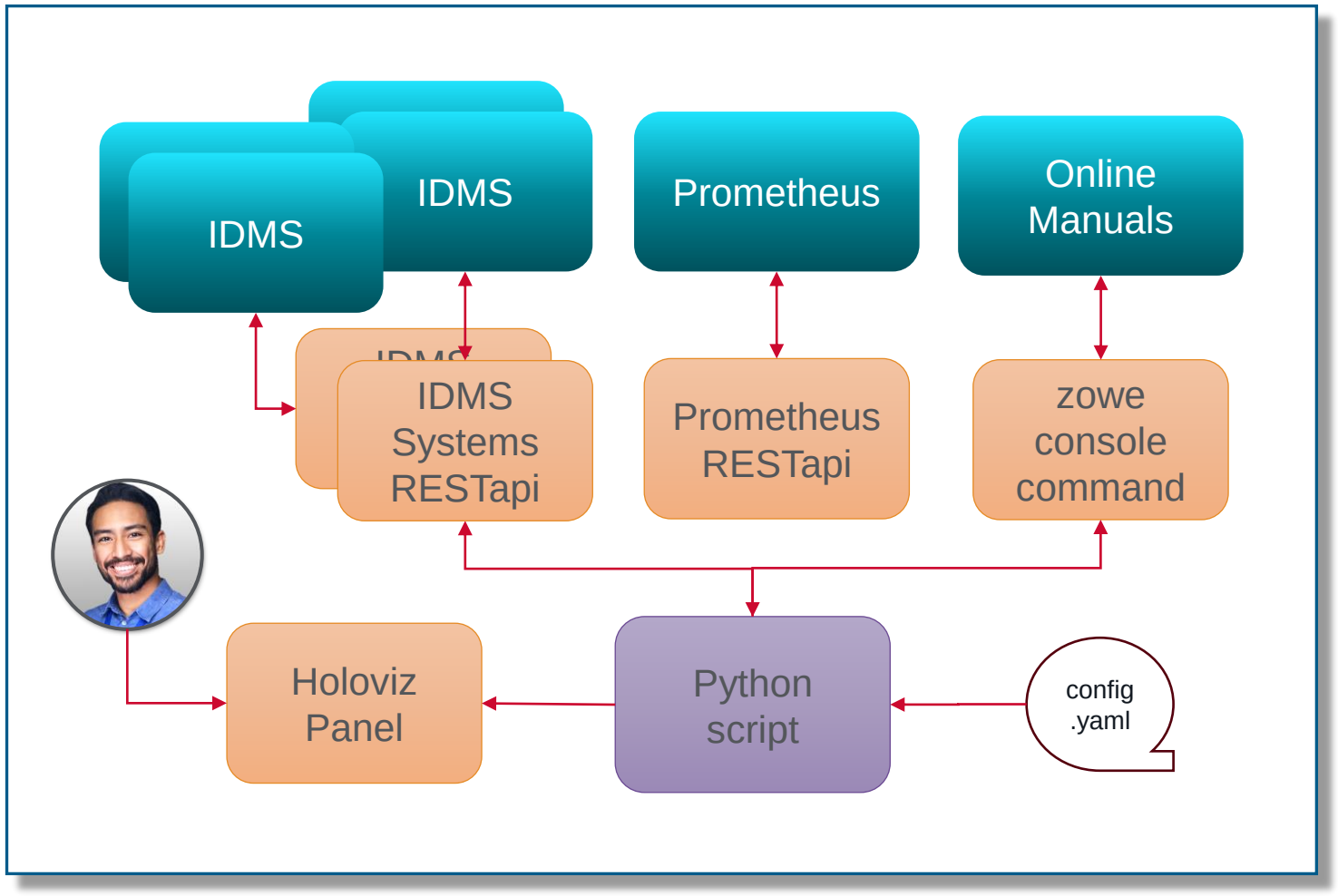
The operator needs to log into the appropriate IDMS system to perform

1. Cancel task
2. View logs

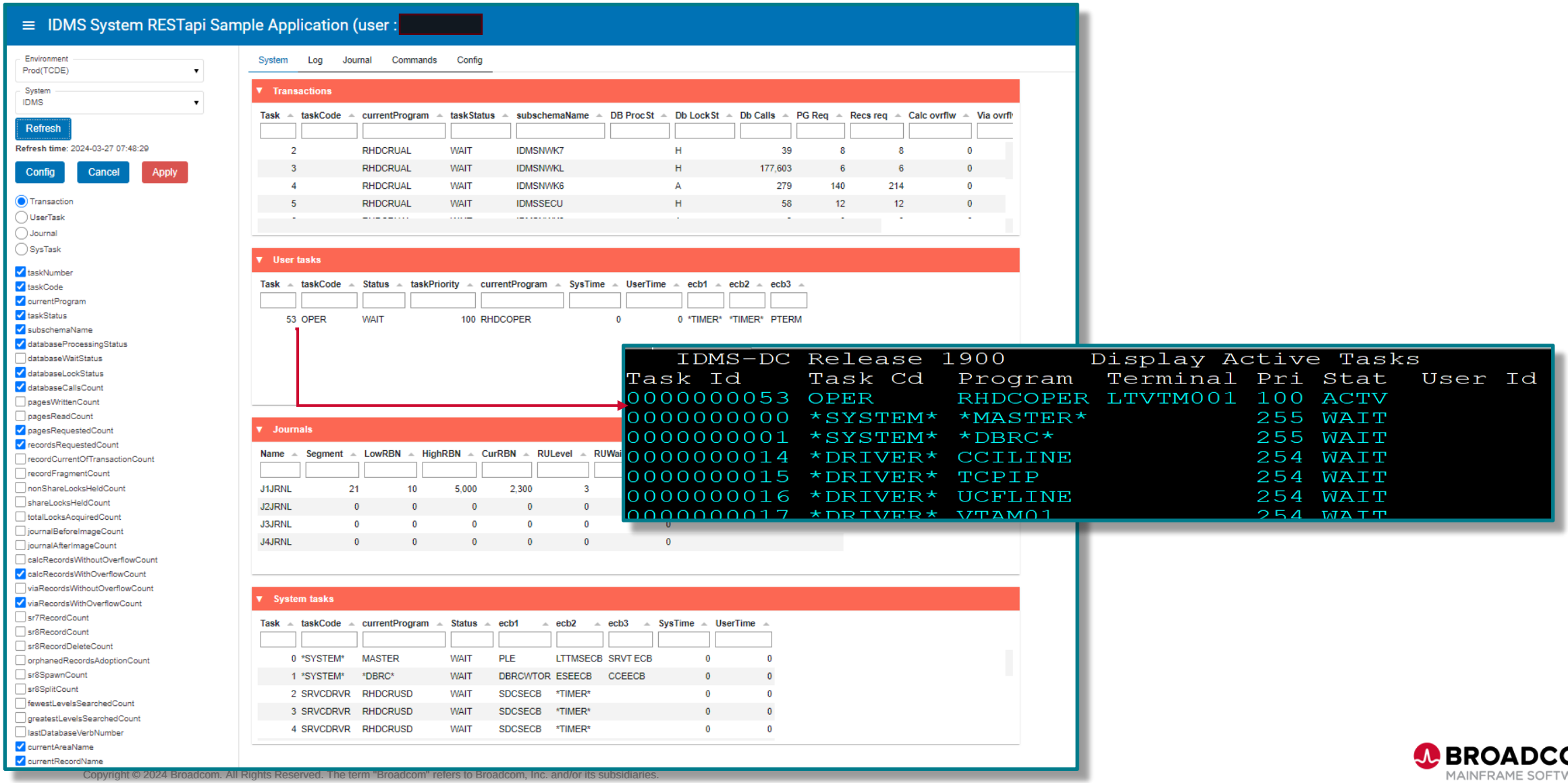
Other views and application configuration options

Use case 3: productivity boost

- Implementation:
  - Python scripts uses Holoviz Panel as a GUI
  - Gets list of all IDMS CV's it can reach trough configured providers
  - From selected CV, gets all configured endpoints data
  - Implements controlled user task cancellation
  - Insights in the log usage from Prometheus
  - Manual supported operator command execution



Productivity boost: configurable UI



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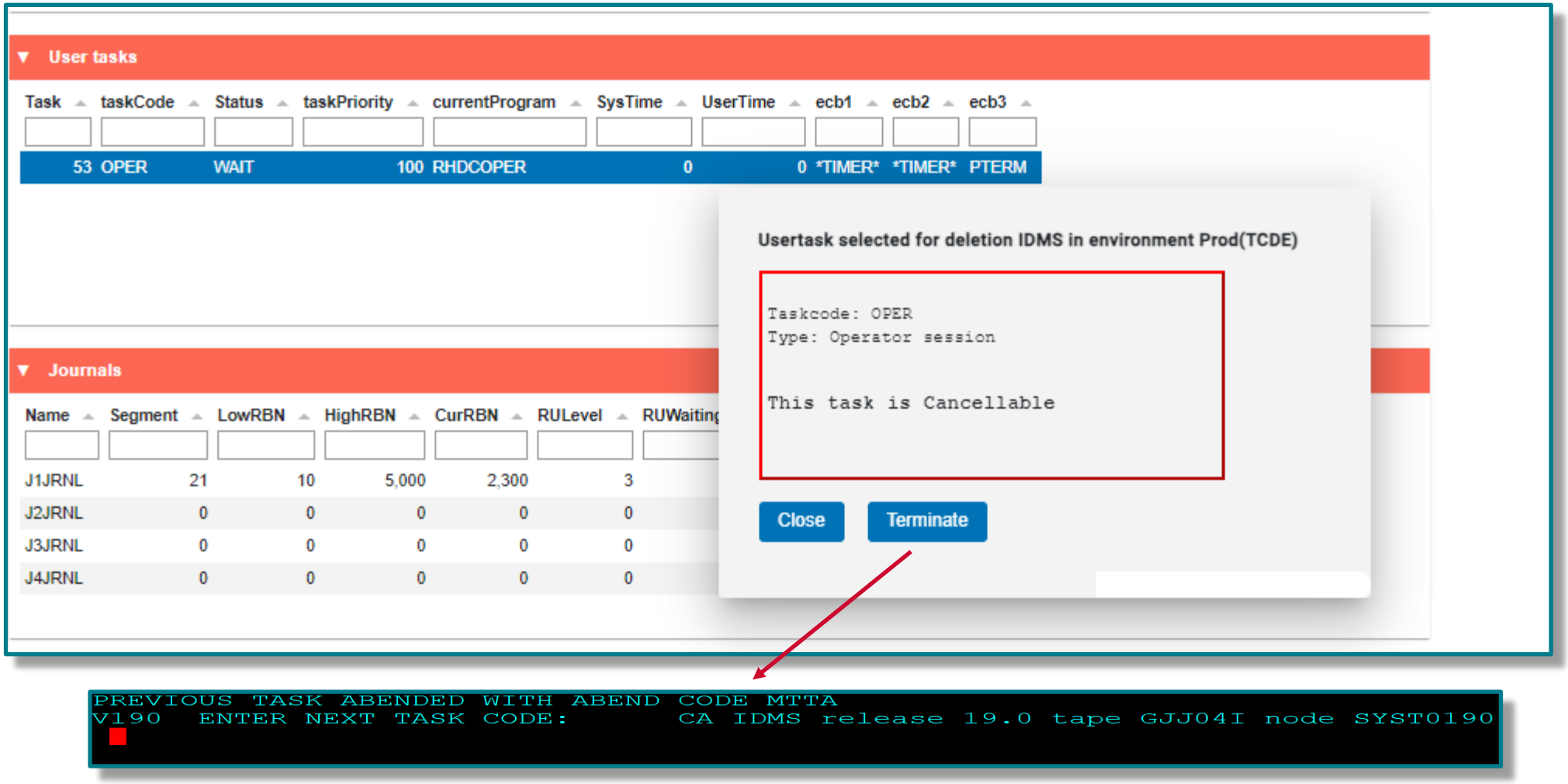
Productivity boost: user task cancellation



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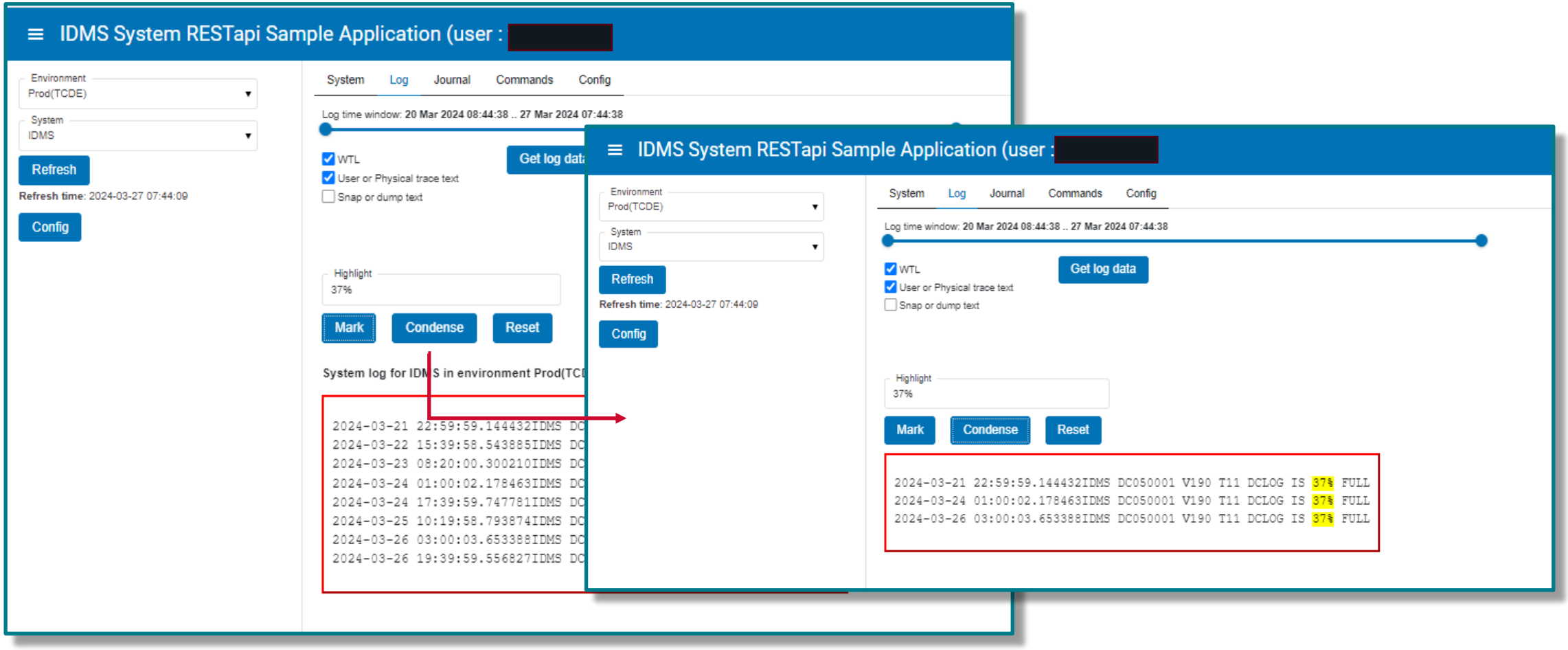
Productivity boost: OPS – SME communication



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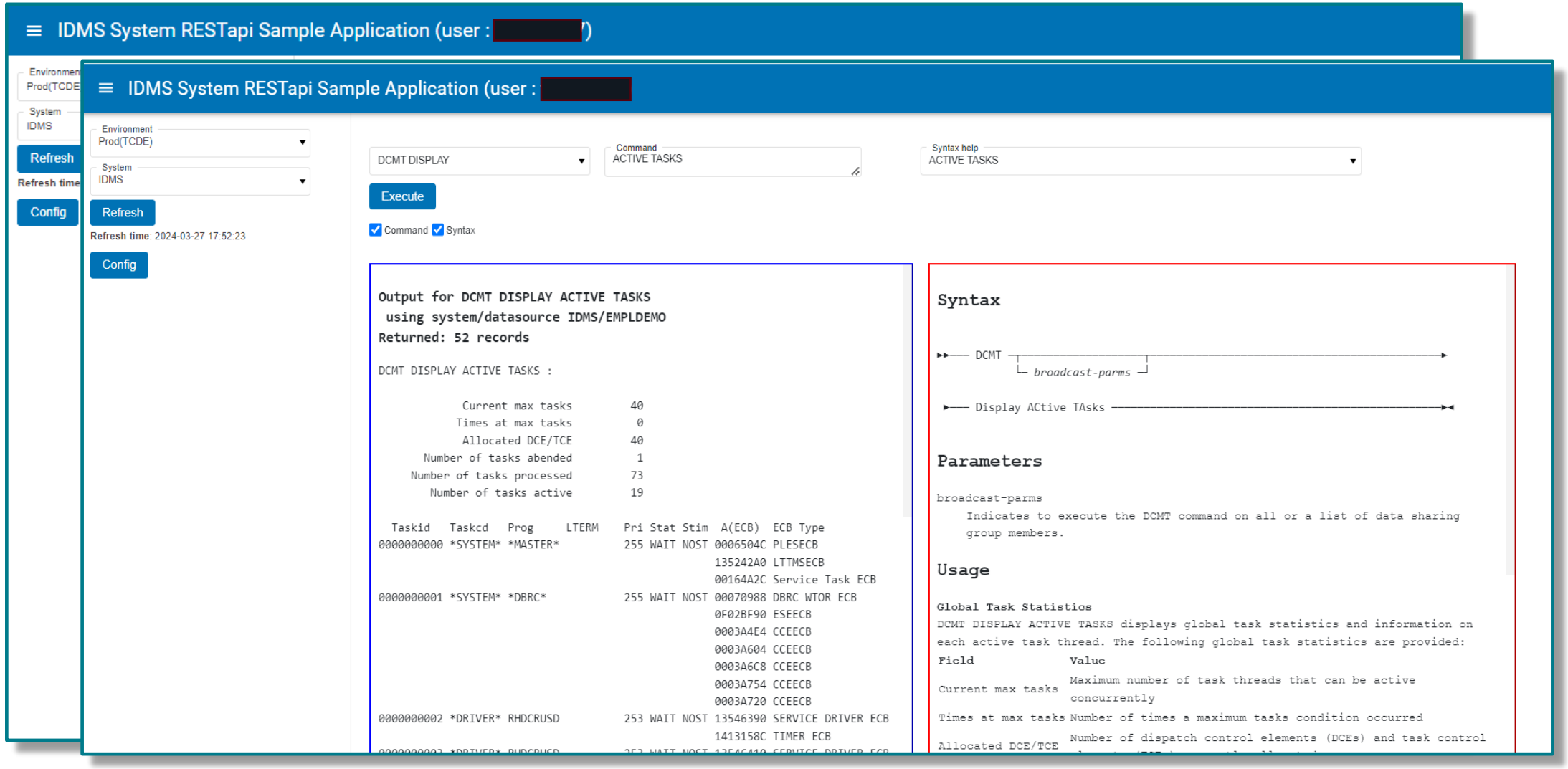
Productivity boost: integrate data sources



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Questions

Broadcom Mainframe Technical Exchanges

✓ European in-person event in Prague: April 16-18

- North American in-person event in Plano, TX: September 10-12 (registration open)
- Global virtual event: October 8-10 (save the date)

Make plans to attend

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