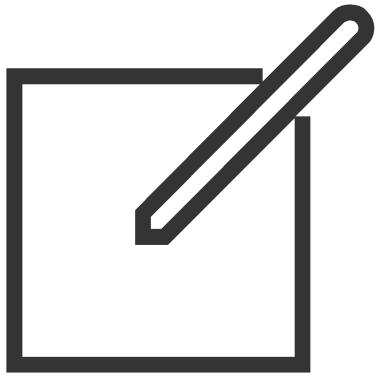


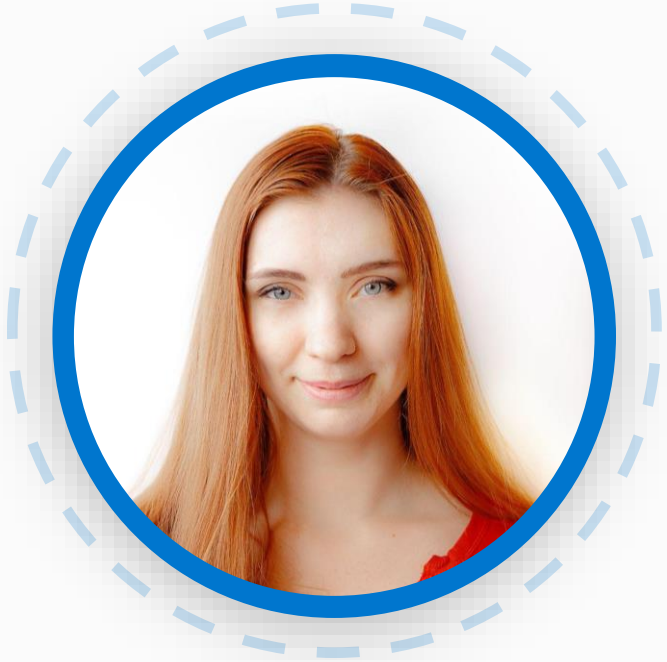
How we built IaaS in testing

Yulia Borisenko
Denis Bozhkov

Our great team

Today is about getting to know each other us and our work.

We hope that it will be useful for you



Yulia Borisenko

Team-lead Automation Team
Dell Technologies

Denis Bozhkov

Tech-lead In-Market Team
Dell Technologies

PowerStore Project

ver.1.0 went GA 05.05.2020

Resources in QA

From web to hardware, from application to OS testing there are a lot of tools required

Time
Efficiency

Hardware
Servers, storage, smartphones, VMs etc.

Team
Number of team-members, qualification

Software
Licenses, soft, OS, applications etc.

Resource management options

Informal

Slack, Skype or Teams chat, small-talk, any informal way

Shared environment

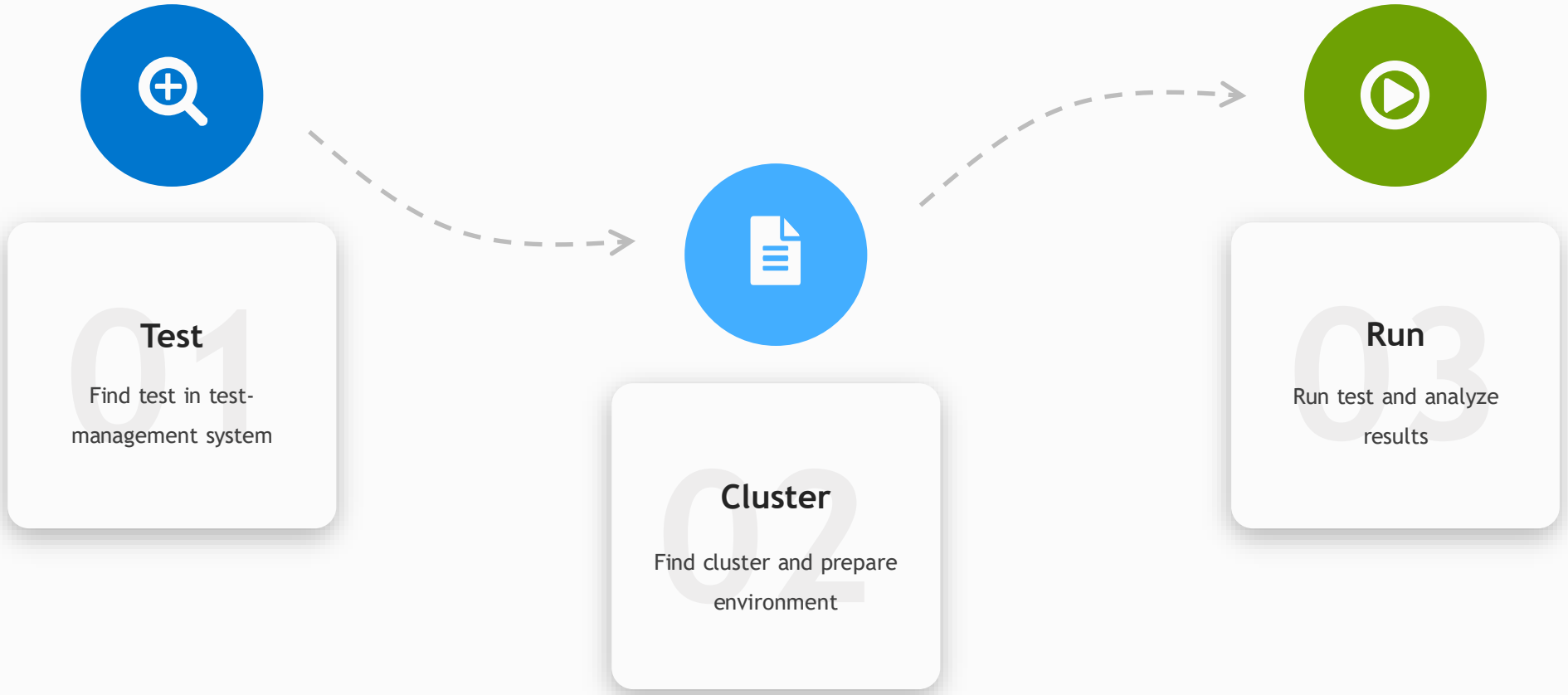
Single prepared environment shared between all team members

Confluence/Excel

Any document or resource with shared access for all team members

Process in the very beginning

Cycle duration: 3 months



History Timeline

CURRENT PHASE:

Confluence + autotests

Manual environment preparation

3m

Cycle duration

3 months

Process issues

Logging
Decentralized logging from all components

Manual
Manual mapping tests docs with autotests in Framework

Environment
A lot of manual intervention required like environment preparation

Monitoring
Requires close monitoring on every step during test run

Reporting
Difficult progress monitoring and reporting for managers

Human factor
Strong influence of the human factor and golden resource problem

Storage Testing

It is a complicated process involving variety of factors, dependencies and different approaches

Hardware-specific

Clusters differ in a set of hardware like many disks vendors and sizes etc.

Resource specific

Necessary to have specific attributes of clusters for different test-scenarios

Time-consuming

The average test run time is about 8 hours. Some may take up to 1 week.

Project specific

It is a complicated project involving engineering teams across the world as well as extreme number of lab equipment

Engineers 200+

From different cultures working in different teams in variety of offices

Labs 4+

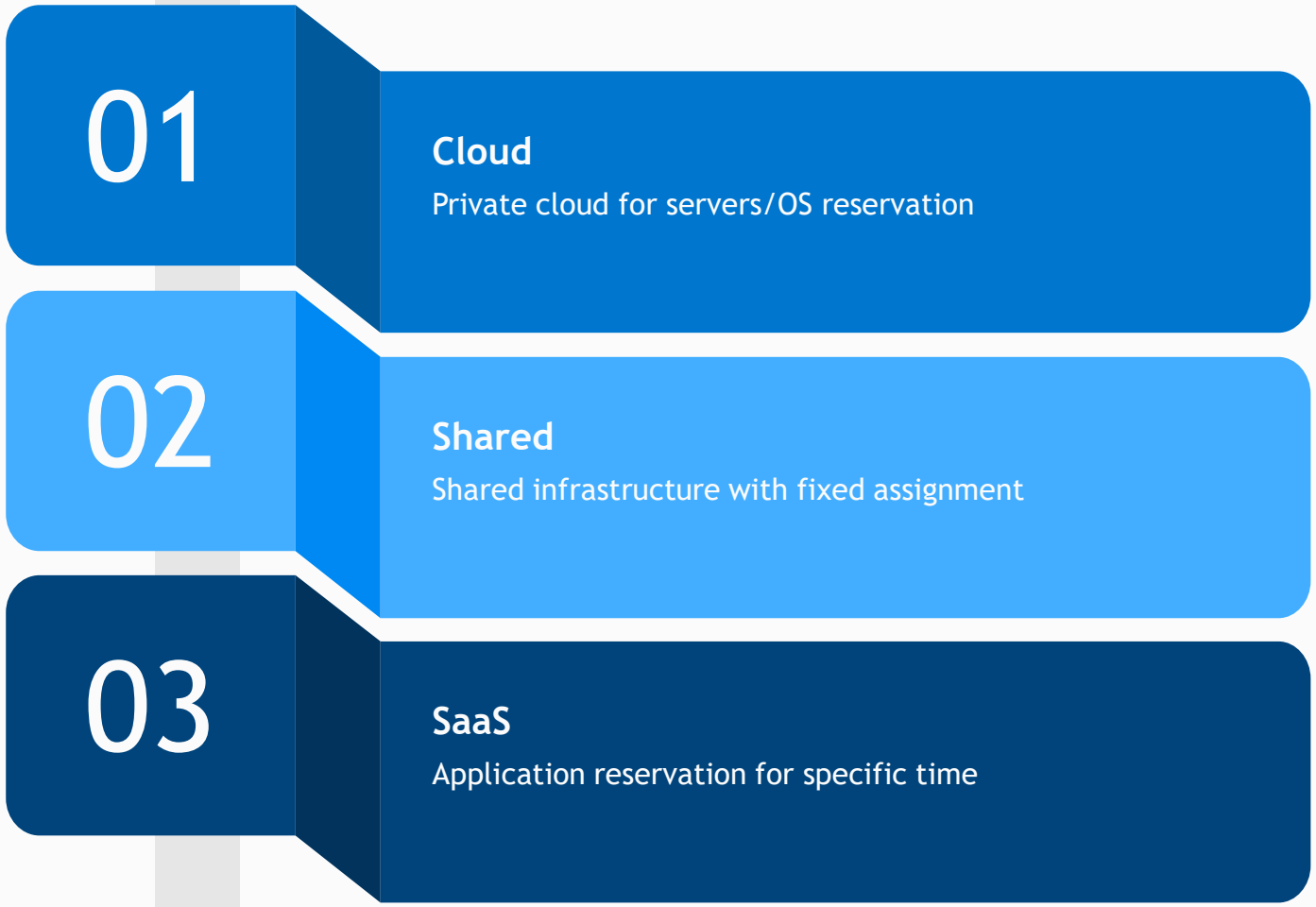
In different parts of the world to satisfy the requirements of engineers

10+ **Time zones**

From Pacific Standard Time to China Standard Time with 15 hours time difference

1 000+ **Storages**

And 3000+ more servers to generate traffic load and test interoperability

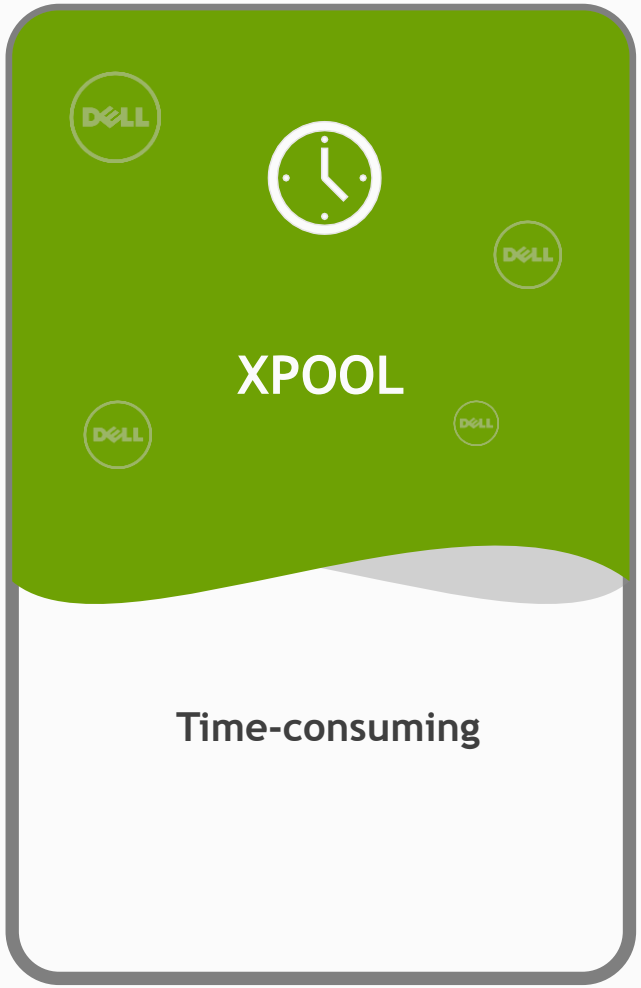


Resource management options

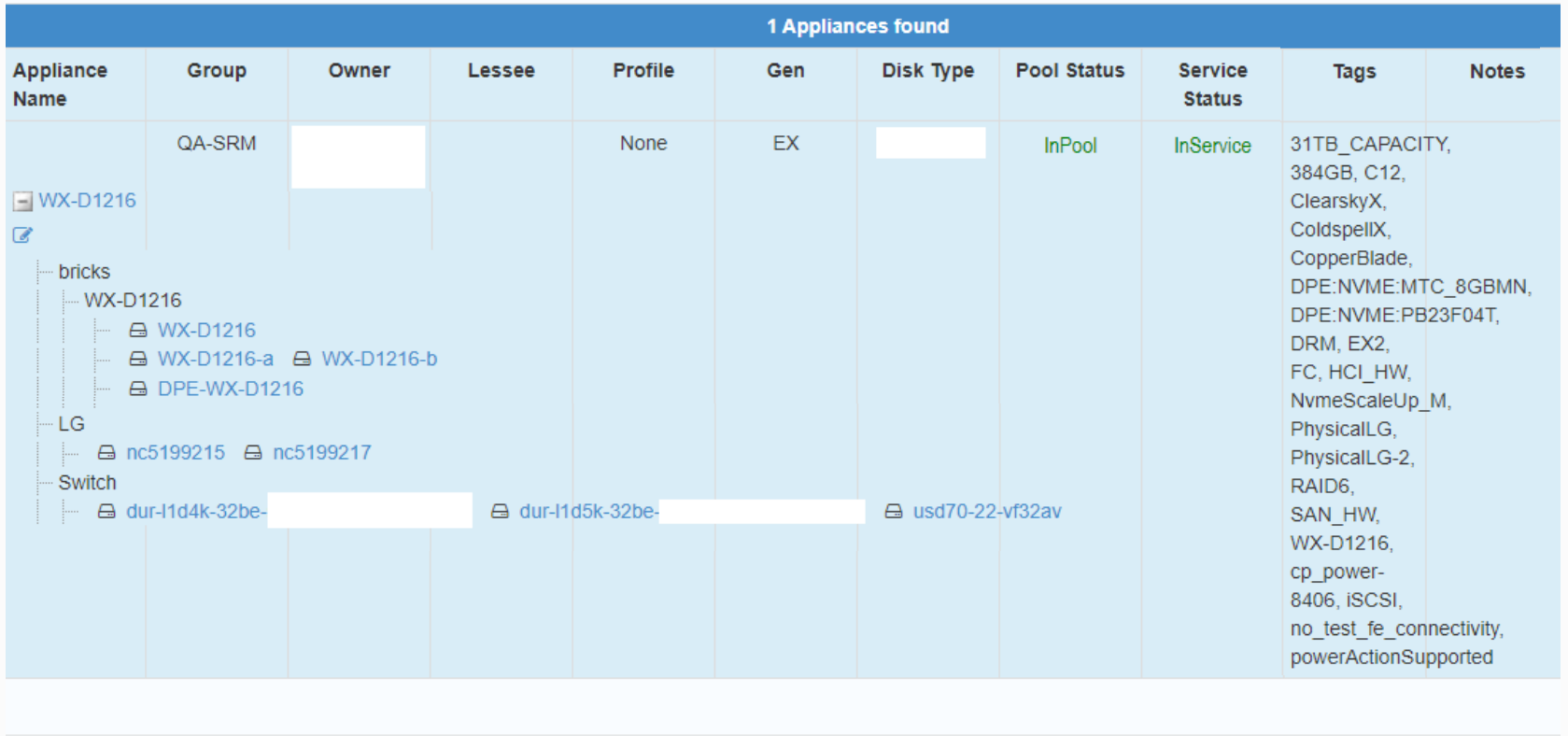
ADVANCED

Additional options for resource management, when basic are not enough.

Dell Resource Management



DB with all info about Hardware resources



1 Appliances found

Appliance Name	Group	Owner	Lessee	Profile	Gen	Disk Type	Pool Status	Service Status	Tags	Notes
WX-D1216	QA-SRM			None	EX		InPool	InService	31TB_CAPACITY, 384GB, C12, ClearskyX, ColdspellX, CopperBlade, DPE:NVME:MTC_8GBMN, DPE:NVME:PB23F04T, DRM, EX2, FC, HCI_HW, NvmeScaleUp_M, PhysicalLG, PhysicalLG-2, RAID6, SAN_HW, WX-D1216, cp_power-8406, iSCSI, no_test_fe_connectivity, powerActionSupported	

bricks
WX-D1216
WX-D1216
WX-D1216-a WX-D1216-b
DPE-WX-D1216
LG
nc5199215 nc5199217
Switch
dur-l1d4k-32be- dur-l1d5k-32be- usd70-22-vf32av

LABJUNGLE

hardware-specific

The tool shows what any cluster consists of. Tags contain all information about the hardware

See more

DB with all info about Hardware resources

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Appliance Name	Group	Owner	Lessee	Profile	Gen	Disk Type	Pool Status	Service Status	Tags	Notes
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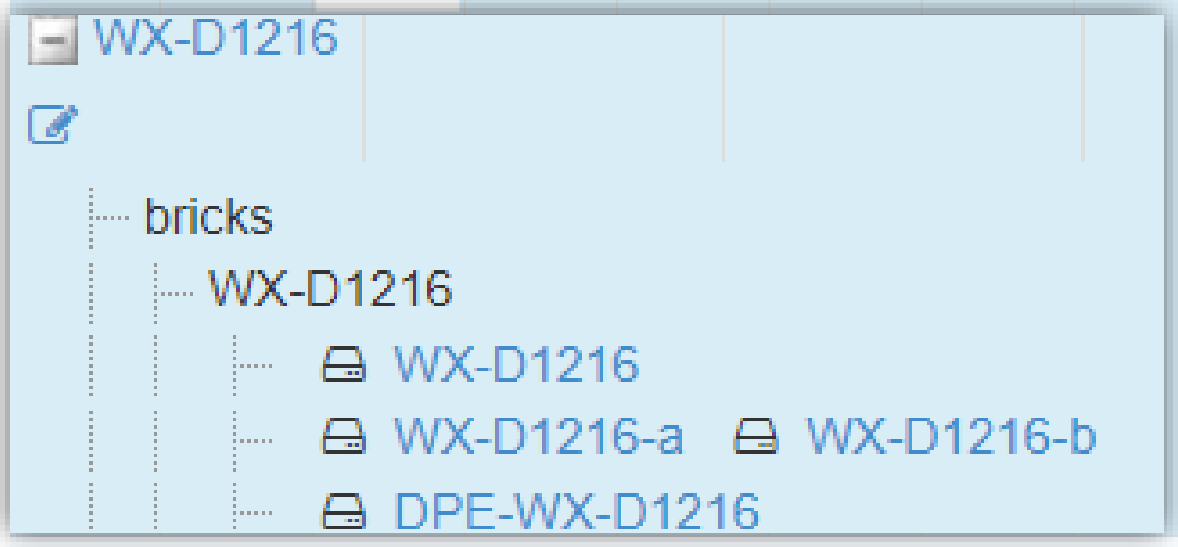

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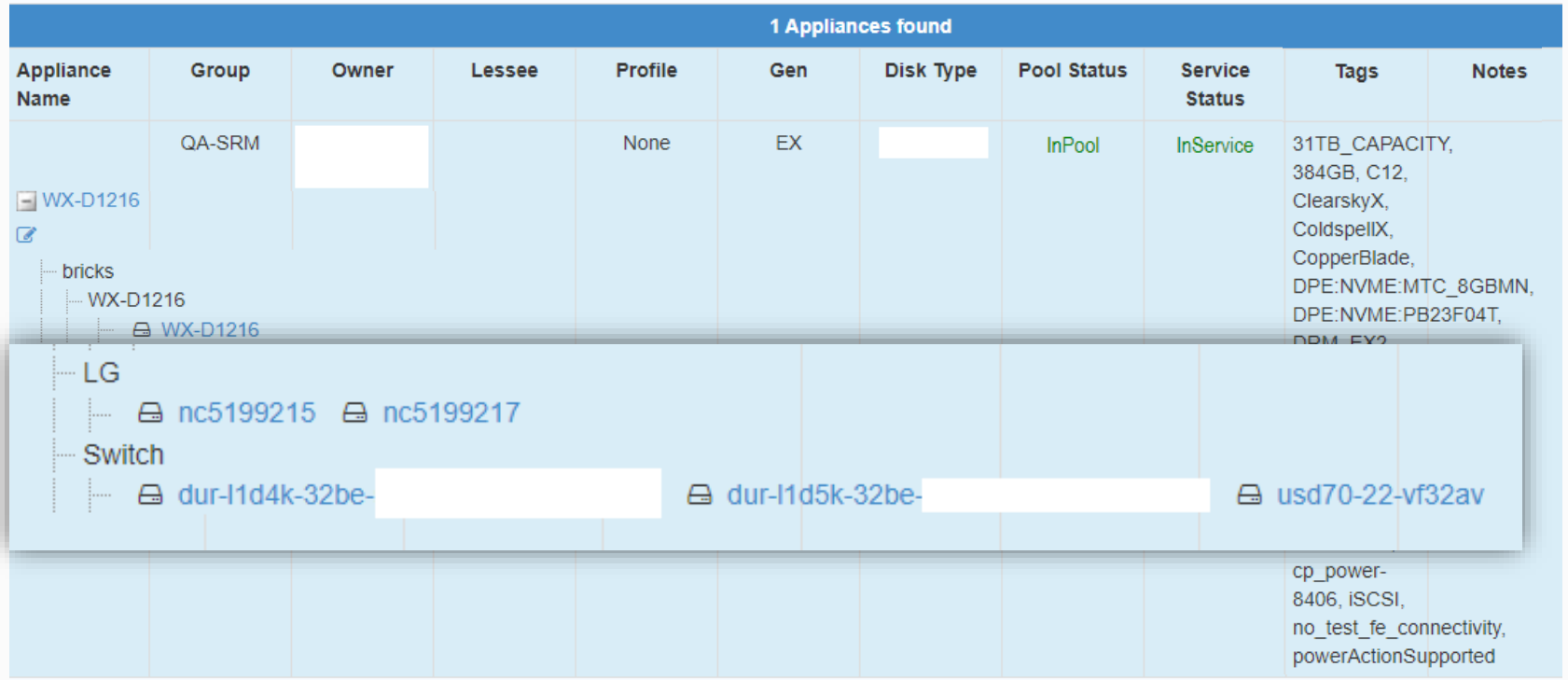

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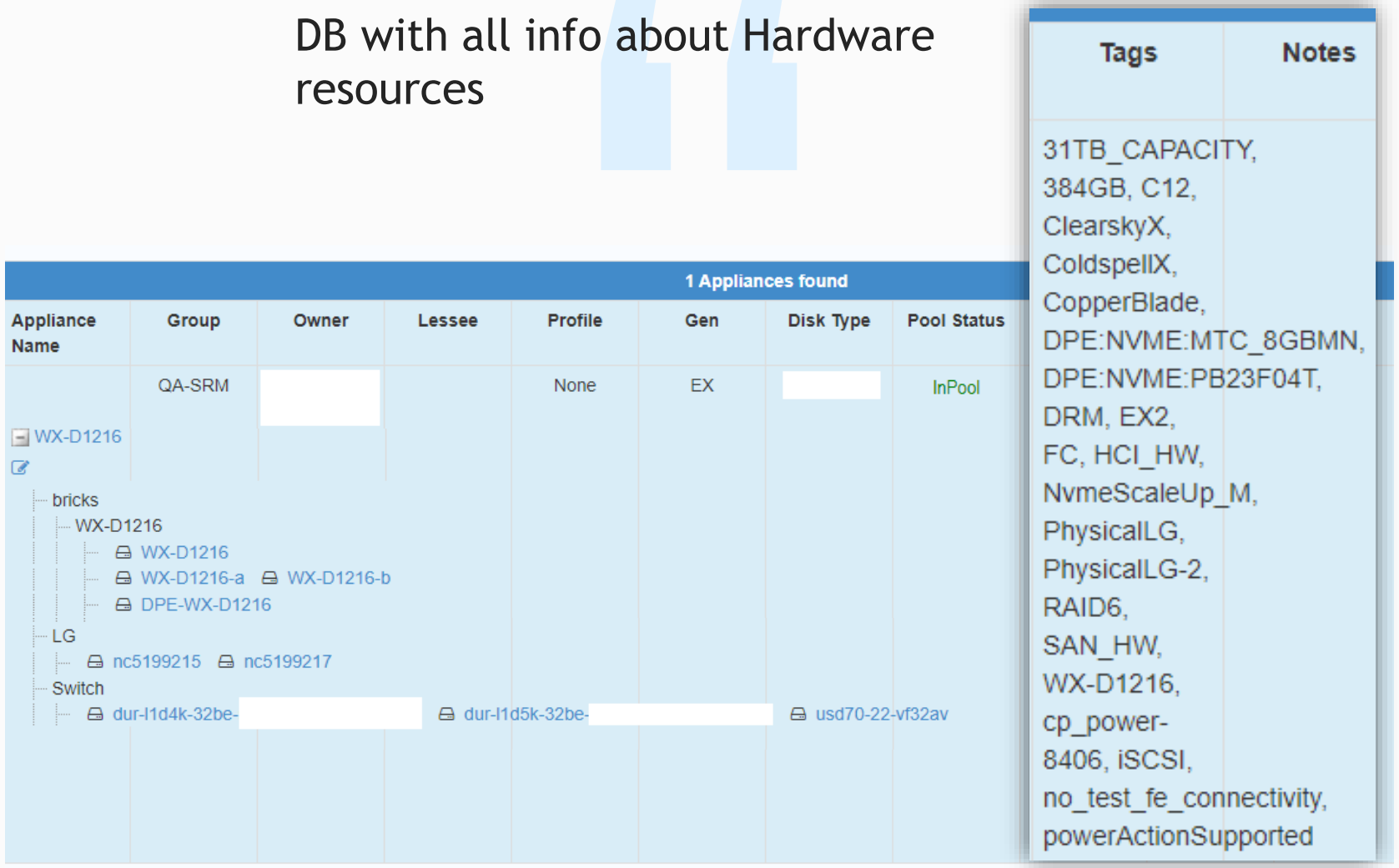

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bricks
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Switch
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LABJUNGLE

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The tool shows what any cluster consists of. Tags contain all information about the hardware

See more

SWARM

Tool for storing environment info as well as essential interchangeable cluster configuration parameters required for deployment

DATA SUMMARY SHEET

Asset Information	
Name	WX-D1216
SPE SN	
PSNT	
Location	
Lab	Lab 1
Tile	32AW
Ownership	
Owner	
Responsible Manager	
Reserved By	Available
Hardware Configuration	
Version	
Model	Warnado EX 2U2N
Crawled Model	PowerStore 3000T
Block/File State	
Memory Cfg	
Machine Type	Physical
Connectivity	
CS0/Mgmt IPv4	192.168.0.50
CS1/Mgmt IPv4	192.168.0.51
Mgmt IPv6	2730:0:050:6ab2::22b
SPA IP	192.168.0.52
SPB IP	192.168.0.53
Versions	
OE Version	
NAS Version	
BIOS	6287
POST	4980

STORAGESYSTEM **WX-D1216**

State | IPs | Hardware | Firmware | Software | Pools | Reservations | TestBeds | Notes | Crawls

SERVICE STATE

State: In service

Issue #:

Details: Enter service state details.

Set By:

Date: Nov 12, 2019 1:04 AM

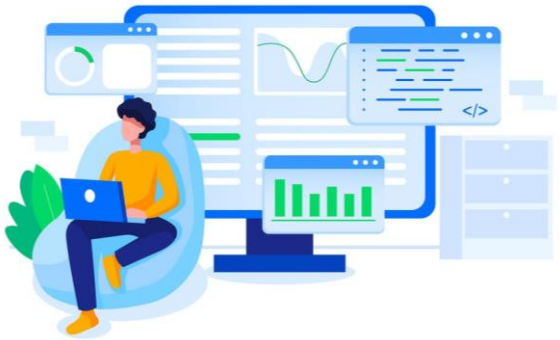
EXEMPT STATUS

Status:
- Exempt from NDU
- Not Exempt from NDU

Details: Enter exempt status details.

Set By: N/A

Date: N/A



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Block/File State	
Memory Cfg	
Machine Type	Physical
Connectivity	
CS0/Mgmt IPv4	192.168.0.50
CS1/Mgmt IPv4	192.168.0.51
Mgmt IPv6	2730:0:050:6ab2::22b
SPA IP	192.168.0.52
SPB IP	192.168.0.53
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STORAGESYSTEM **WX-D1216**

State | IPs | Hardware | Firmware | Software | Pools | Reservations | TestBeds | Notes | Crawls

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EXEMPT STATUS

Status:
- Exempt from NDU
- Not Exempt from NDU

Details: Enter exempt status details.

Set By: N/A

Date: N/A

TESTBED **QE_Testbed_395**

Storage Systems | Hosts | Switches | Reservations | Relationships

SWITCHES

Name	Swarm ID	*Management IP*
dur-l1d5k-32be-sw10....	228	192.168.0.11
dur-l1d4k-32be-sw12....	230	192.168.0.12
dur-l1d5k-32be-sw16....	232	192.168.0.13
usd70-22-vf32av	233	10.0.0.22

TESTBED **QE_Testbed_395**

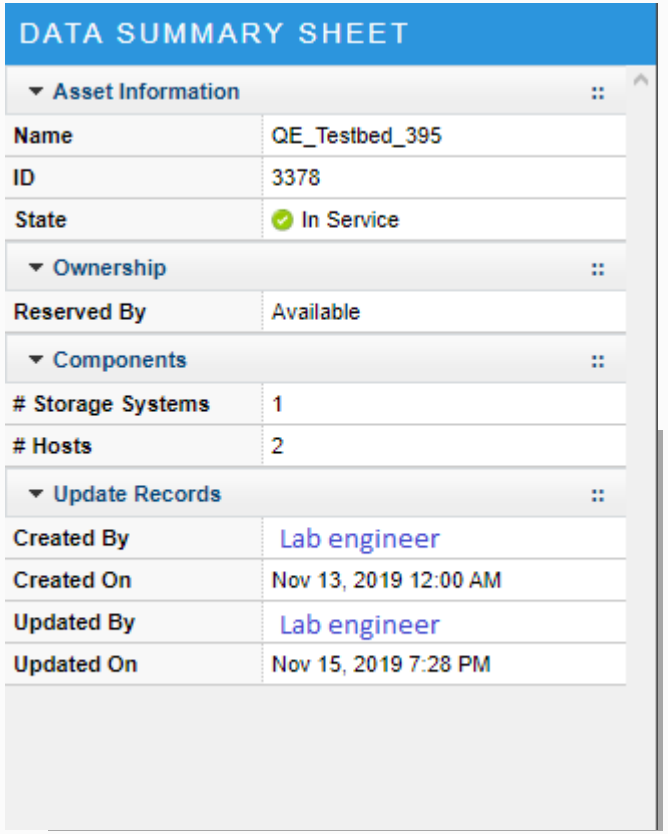
Storage Systems | Hosts | Switches | Reservations | Rela

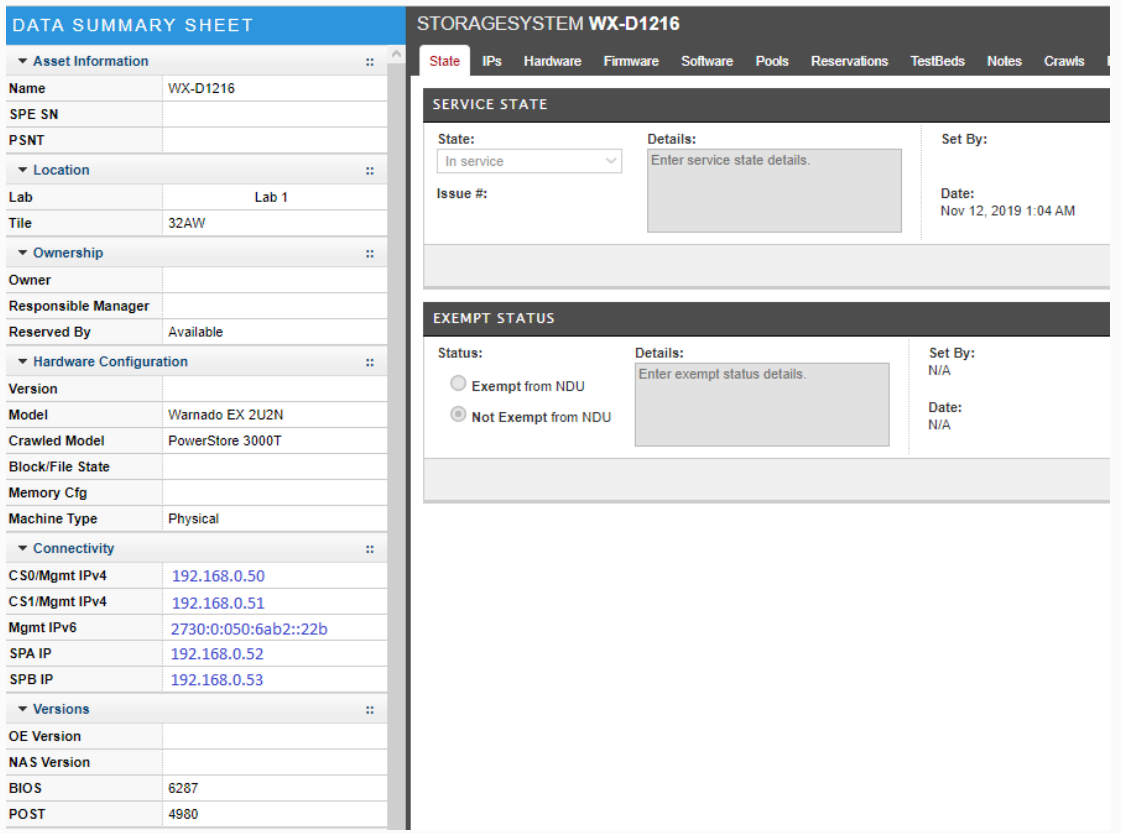
HOSTS

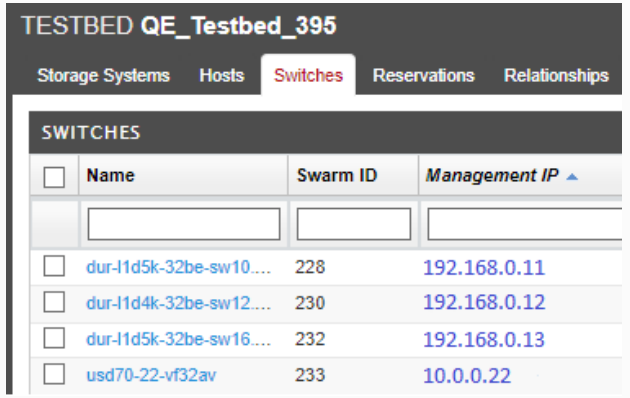
Name	Management I...	Model	Type
nc5199217	192.168.0.99	R640	Physical
nc5199215	192.168.0.100	R640	Physical

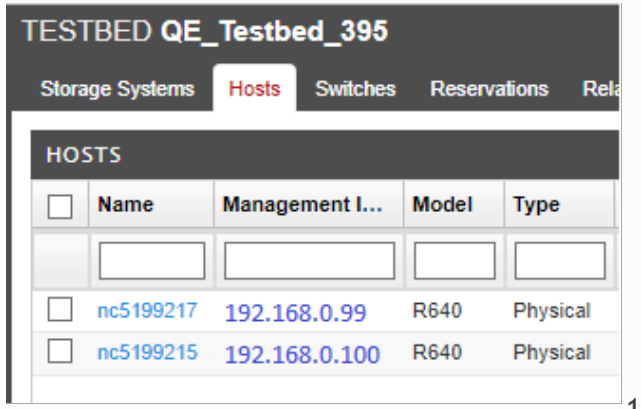
SWARM

Tool for storing environment info as well as essential interchangeable cluster configuration parameters required for deployment



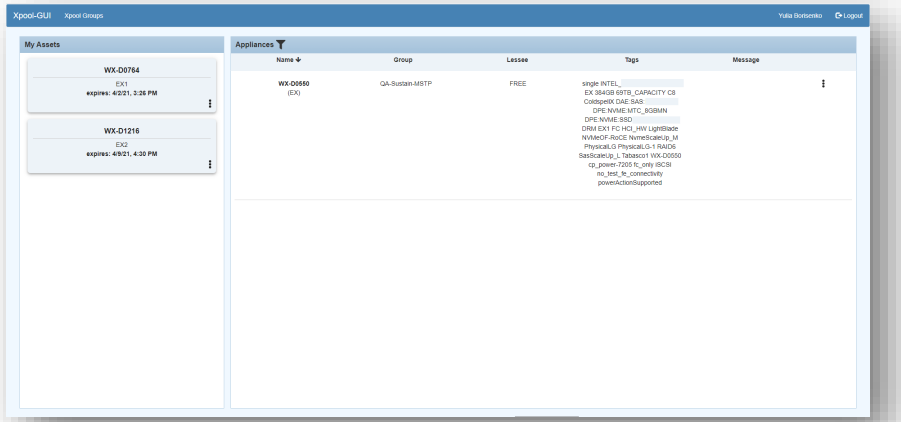


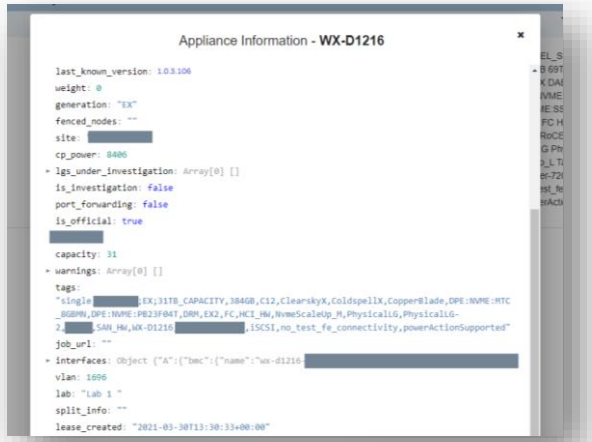


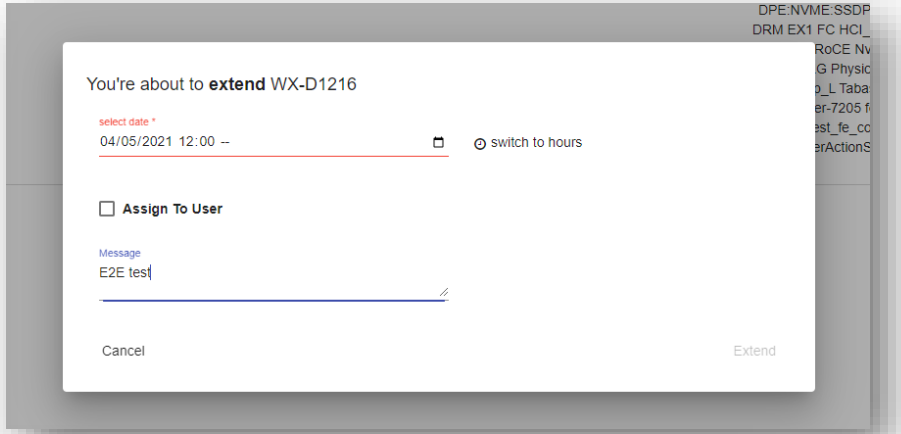


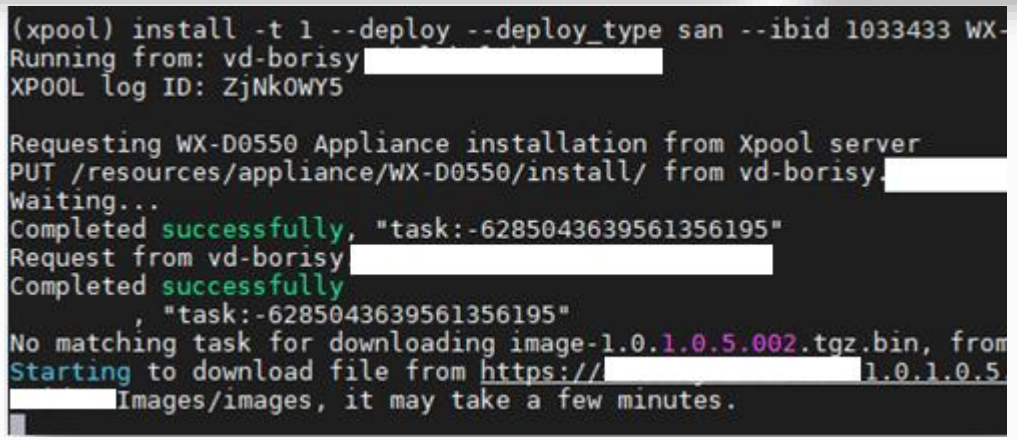
XPOOL

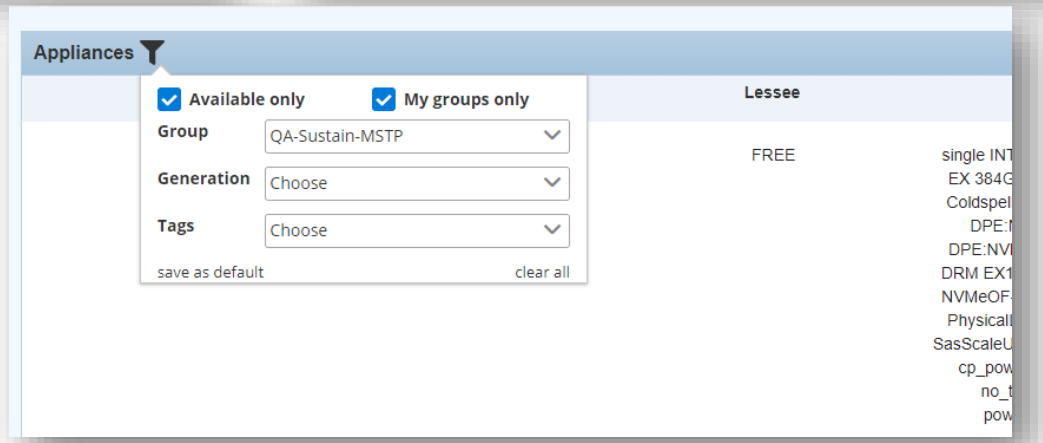
Tool for resource distribution, reservation and automatic deployment of the clusters and loader servers





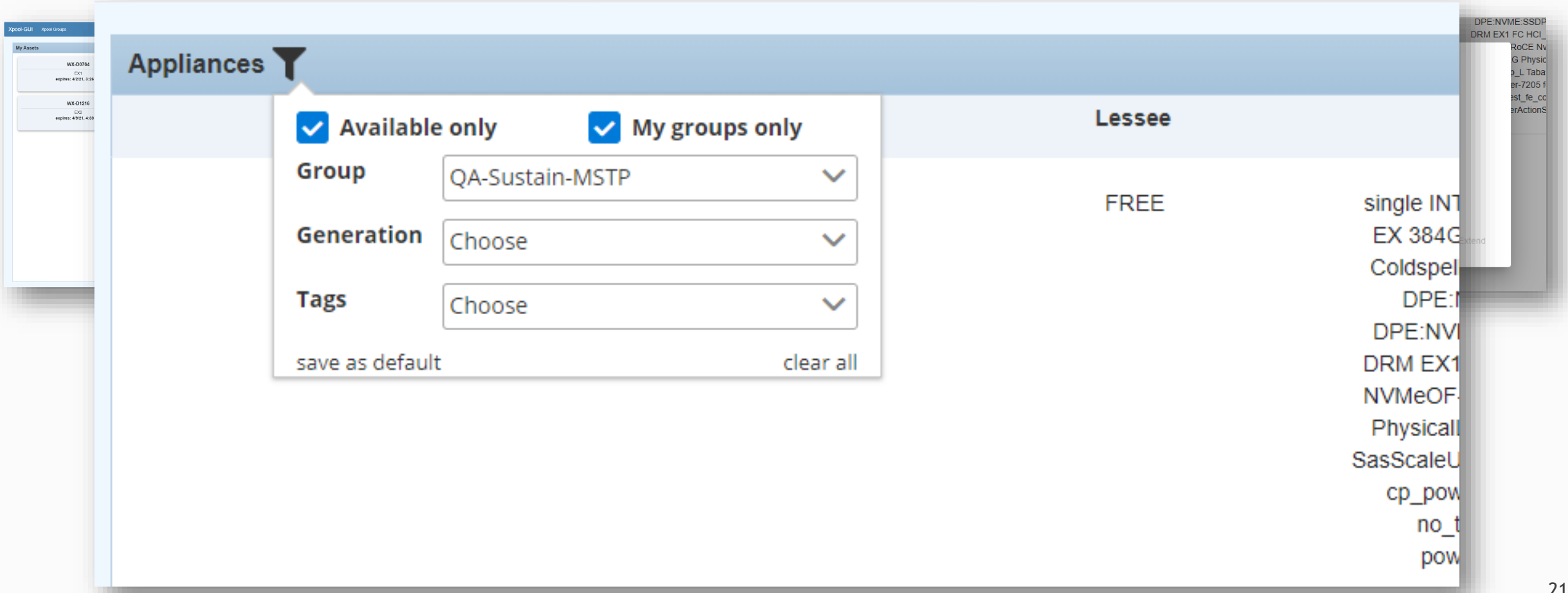






XPOOL

Tool for resource distribution, reservation and automatic deployment of the clusters and loader servers



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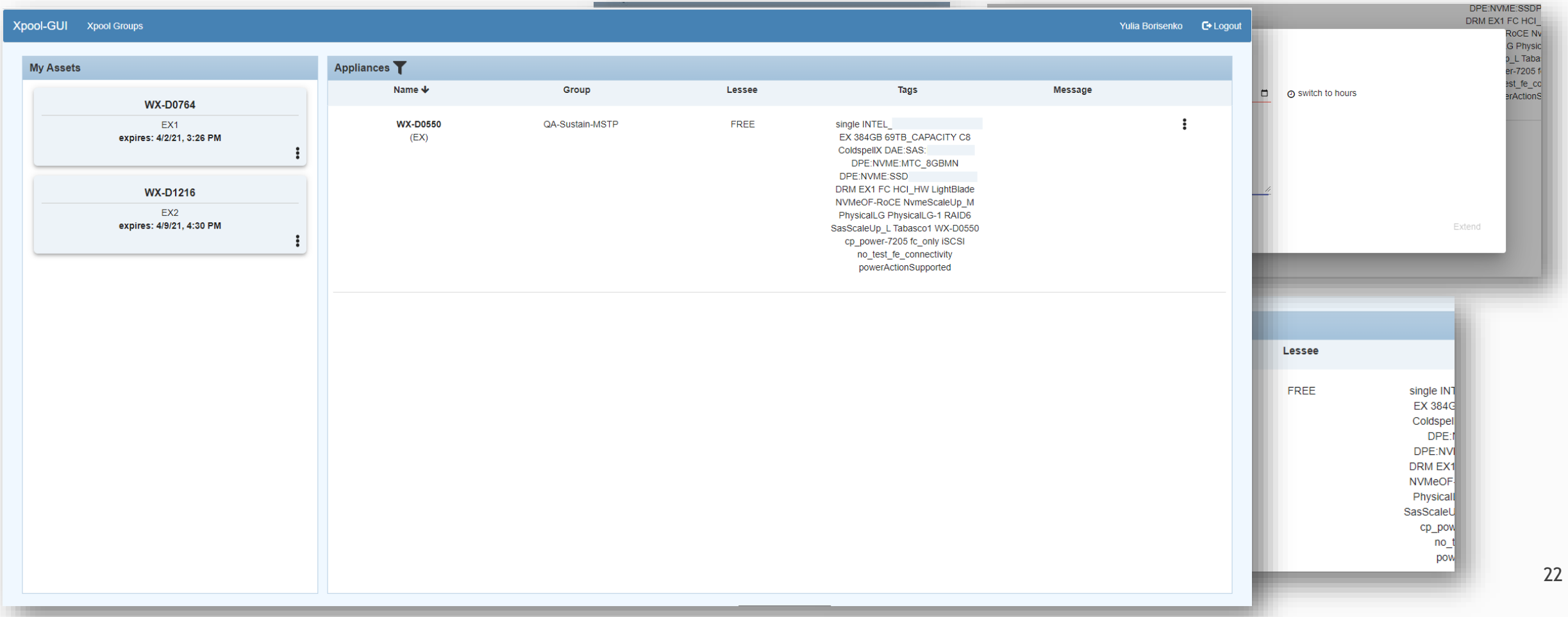

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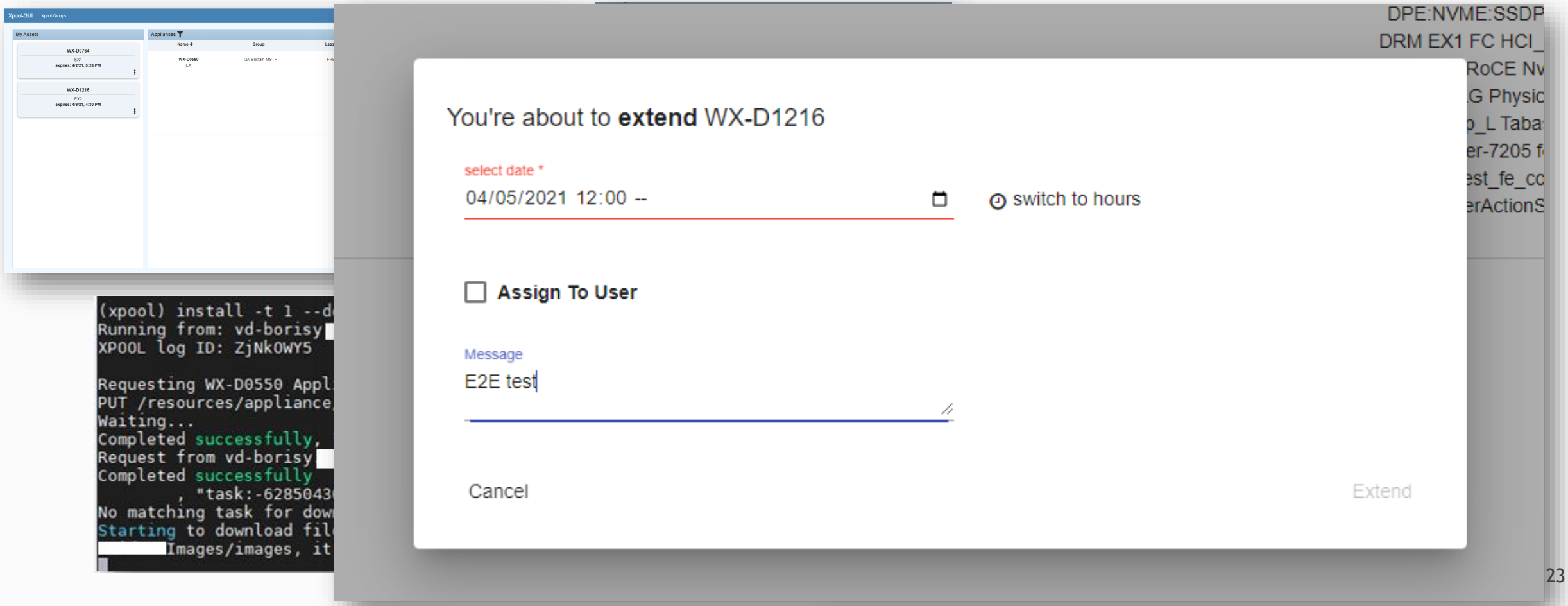

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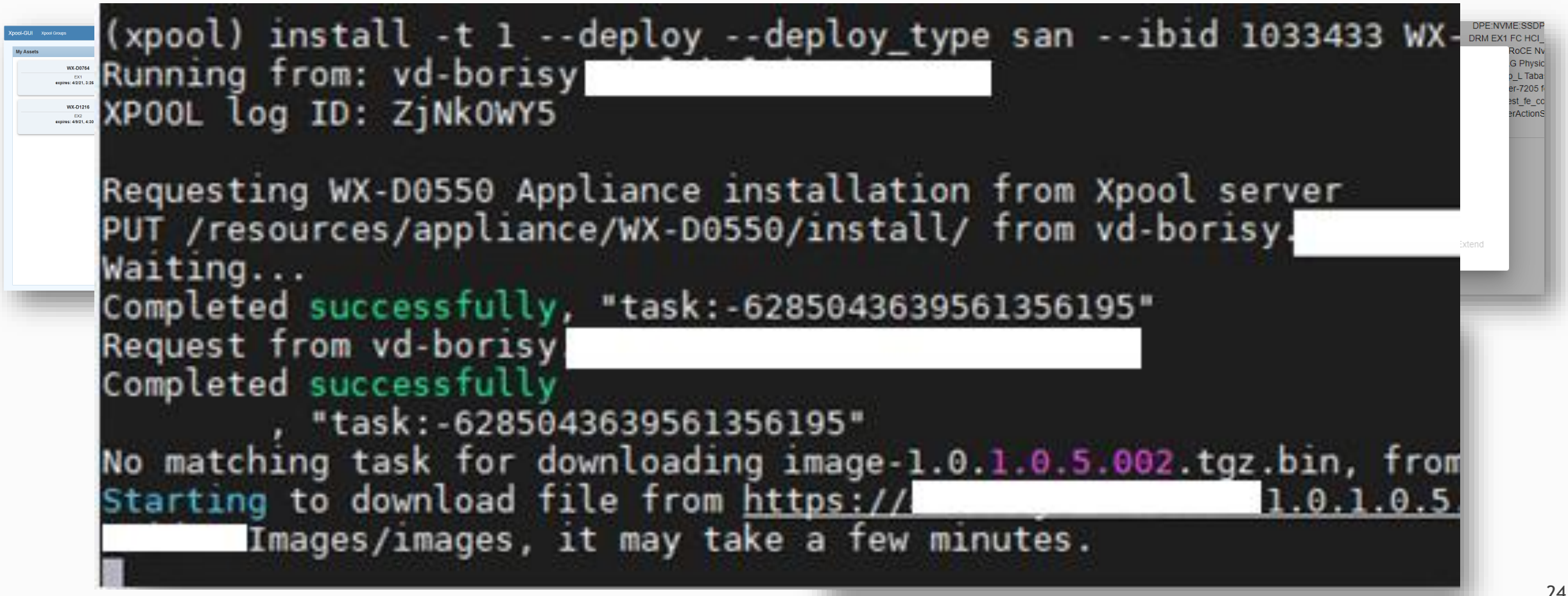
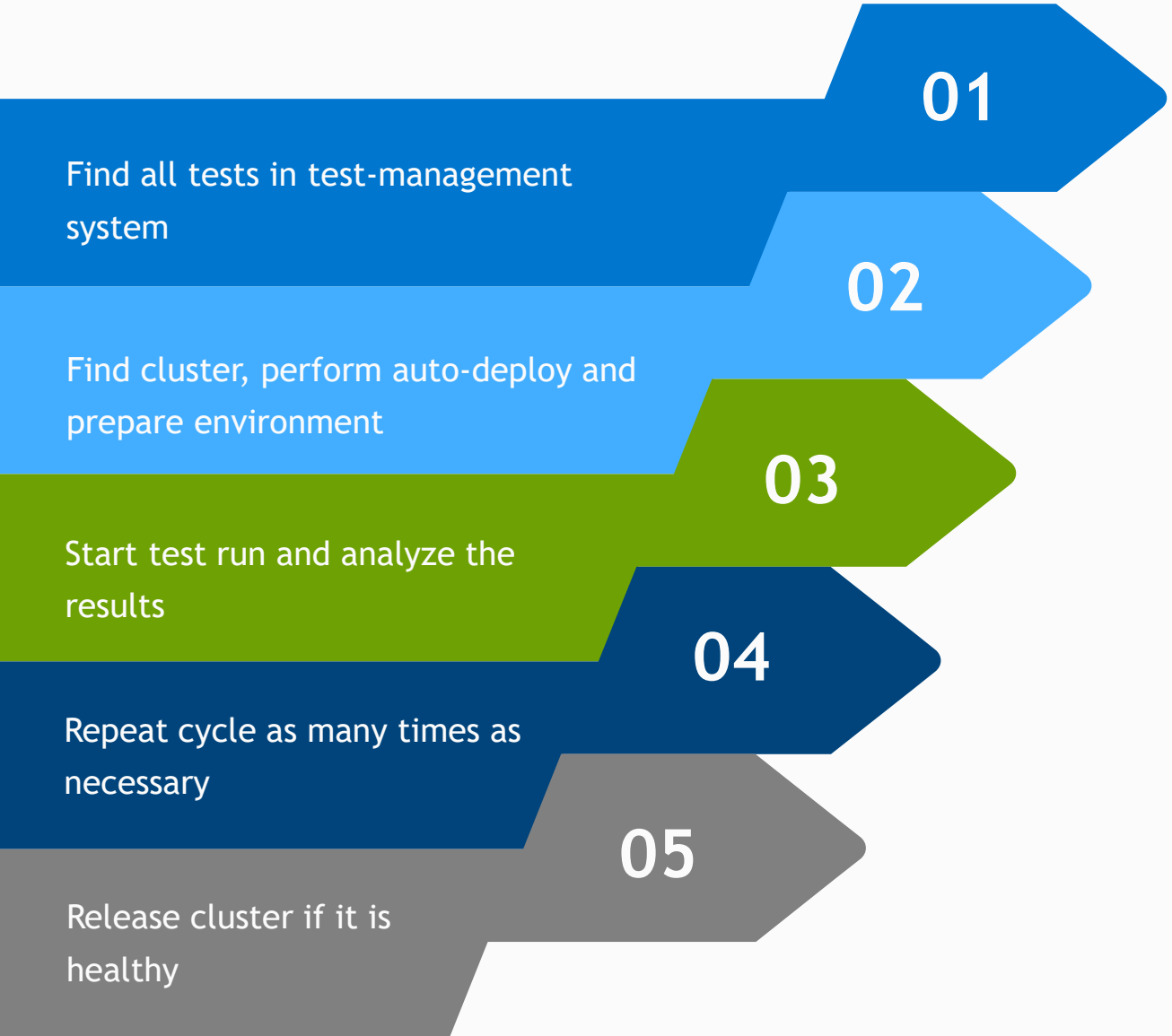




Process after first optimization

During test cycle run there are 3 resource managements tools LabJungle, SWARM and Xpool used for proper resource distribution as well as automatic cluster installation and environment preparation.

2 months
cycle duration

History Timeline

PHASE 1:

Confluence + autotests

Manual environment preparation

CURRENT PHASE:

Resource management tools + autotests

2m

Cycle duration

2 months

Process issues

Logging
Decentralized logging from all components

Manual
Manual mapping tests docs with autotests in Framework

Environment
A lot of manual intervention required like environment preparation

Monitoring
Requires close monitoring on every step during test run

Reporting
Difficult progress monitoring and reporting for managers

Human factor
Strong influence of the human factor and golden resource problem

Optimization options

Jenkins

Jenkins integration with autotests and implementation of matrix plugin

Pipeline

Pipeline integration with autotests for further optimization

Else

Find another tools and options or build something different

Jenkins with matrix plugin

A multi-configuration project is useful for instances where your builds will make many similar build steps, and you would otherwise be duplicating steps

I have

- Run many tests in parallel
- **Use many cluster in parallel**
- Flexible parameters
- Integration with resource management

I have

- Run many tests in parallel from single area only
- Cannot run multiple tests on single cluster sequentially
- **Flexible parameters but not for complex run**

Pipeline

Jenkins Pipeline is a suite of plugins that supports implementing and integrating continuous delivery pipelines into Jenkins. Pipeline provides an extensible set of tools for modeling simple-to-complex delivery pipelines "as code“

I have

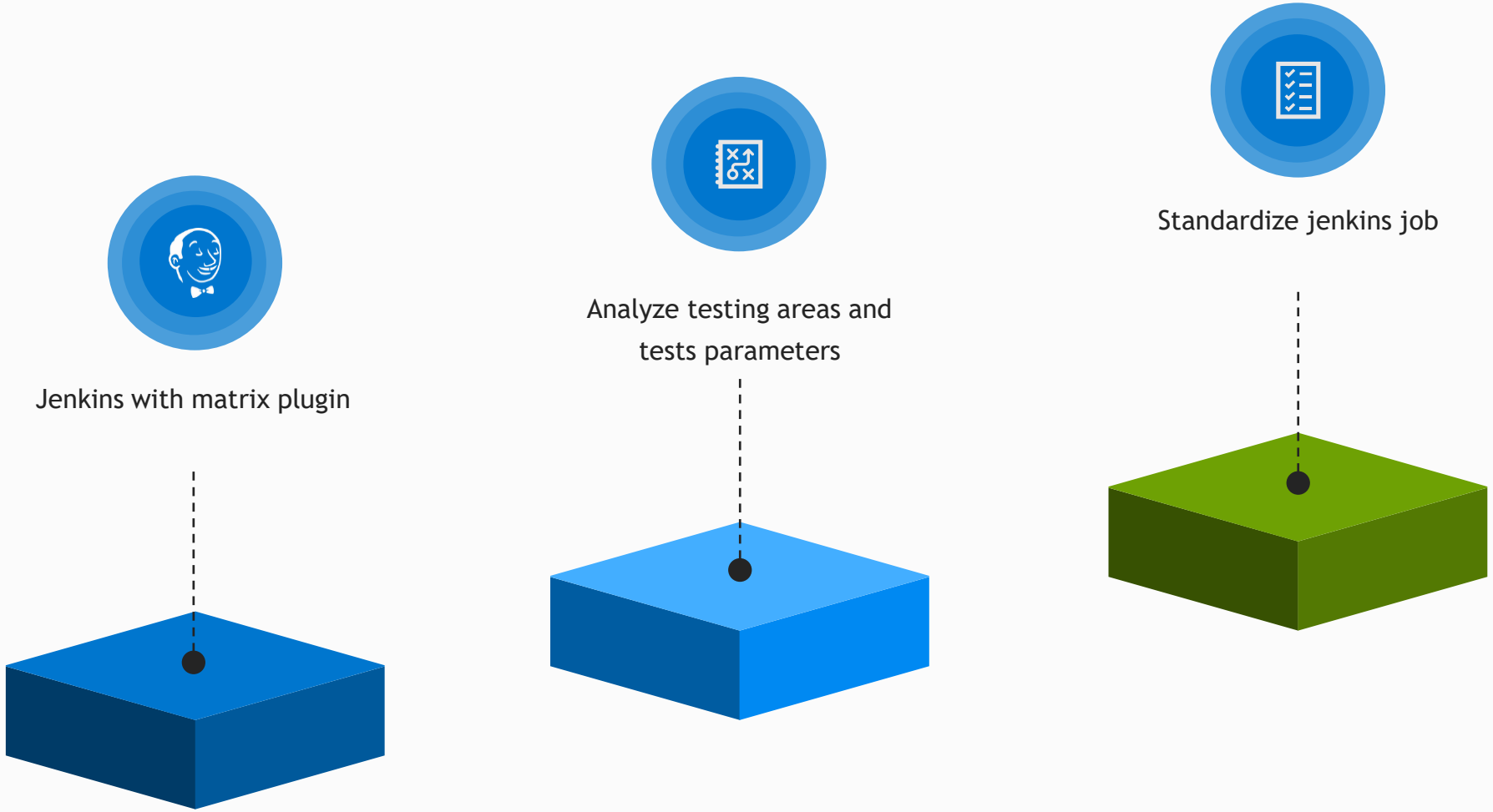
- Run many tests on single cluster
- **Easy full testing of a single area**

I have

- Strict order
- Missing flexibility in tests run
- **Flexible parameters impossible**

Next optimization phase

Jenkins with matrix plugin



> Talent wins games, but teamwork and intelligence win championships

Jenkins job standard

document

Describing structure and parameters definition for any Jenkins Job in the project.

Cluster options

Hardware resource specifics

Deploy options

Parameters used for deploy and configuration

Pre-condition options

Pre-condition parameters for test run

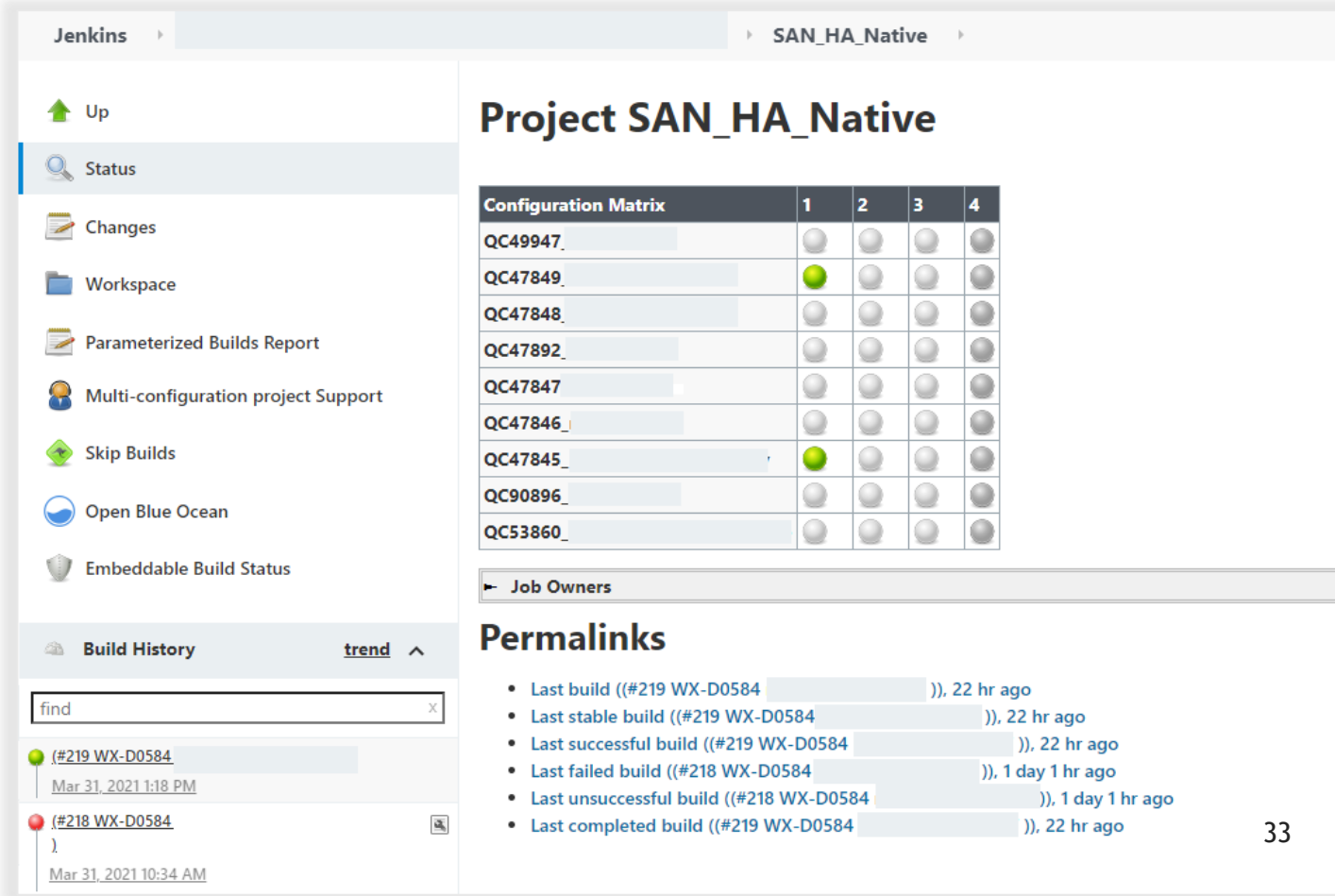
Background options

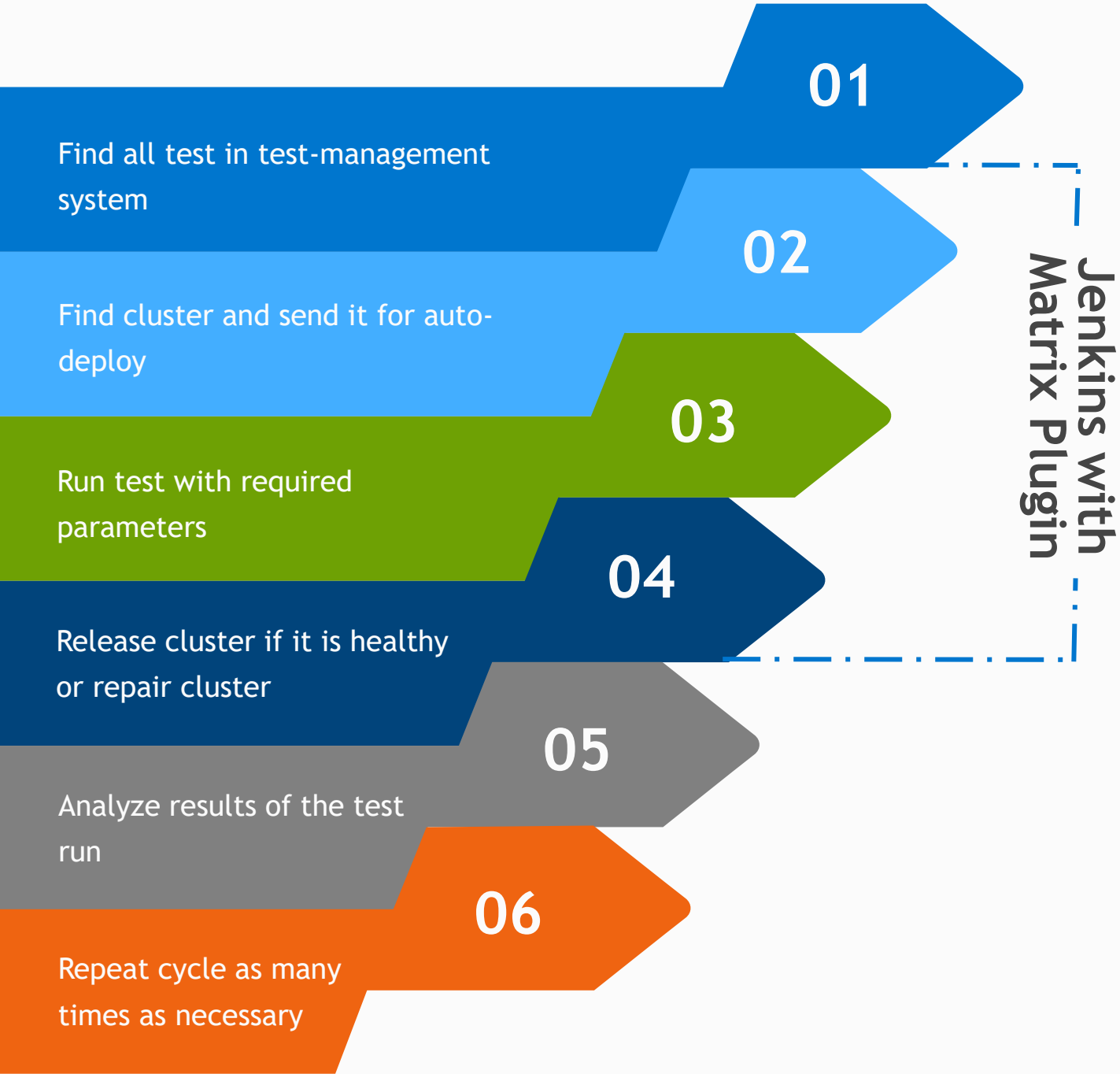
Options describing background processes

Test options

Options describing tests specific

Jenkins job standard





Process after second optimization

During test cycle run there are 3 resource managements tools LabJungle, SWARM and Xpool used for proper resource distribution as well as automatic cluster installation and environment preparation, these tools as well as autotests are integrated into Jenkins Jobs with matrix plugin for ease of use and centralized logging

1 months
cycle duration

History Timeline

PHASE 1:

Confluence + autotests

Manual environment preparation

PHASE 2:

Resource management tools + autotests

1m

Cycle duration

1 months

02.
Timeline

CURRENT PHASE:

Resource management tools + autotests + jenkins with matrix plugin

1m

Cycle duration

1 months

Process issues

Logging

Decentralized logging from all components

Manual

Manual mapping tests docs with autotests in Framework

Environment

A lot of manual intervention required like environment preparation

Monitoring

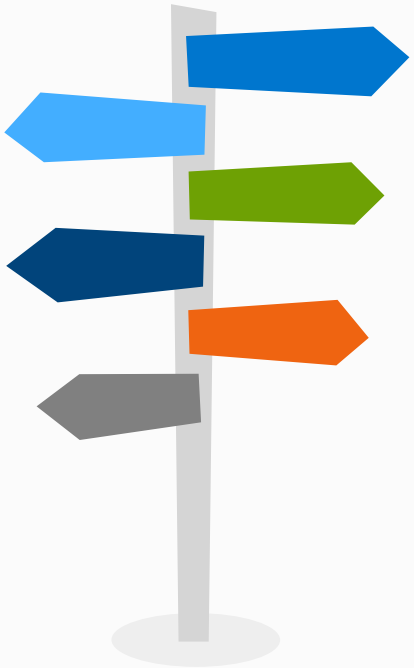
Requires close monitoring on every step during test run

Reporting

Difficult progress monitoring and reporting и тут еще пару слов

Human factor

Strong influence of the human factor and golden resource problem



Process issues

Hardware downtime

Hardware downtime and lack of unique configurations

Manual

Manual mapping tests docs with autotests in Framework

Environment

A lot of manual intervention required like environment preparation

Monitoring

Requires close monitoring on every step during test run

Reporting

Difficult progress monitoring and reporting и тут еще пару слов

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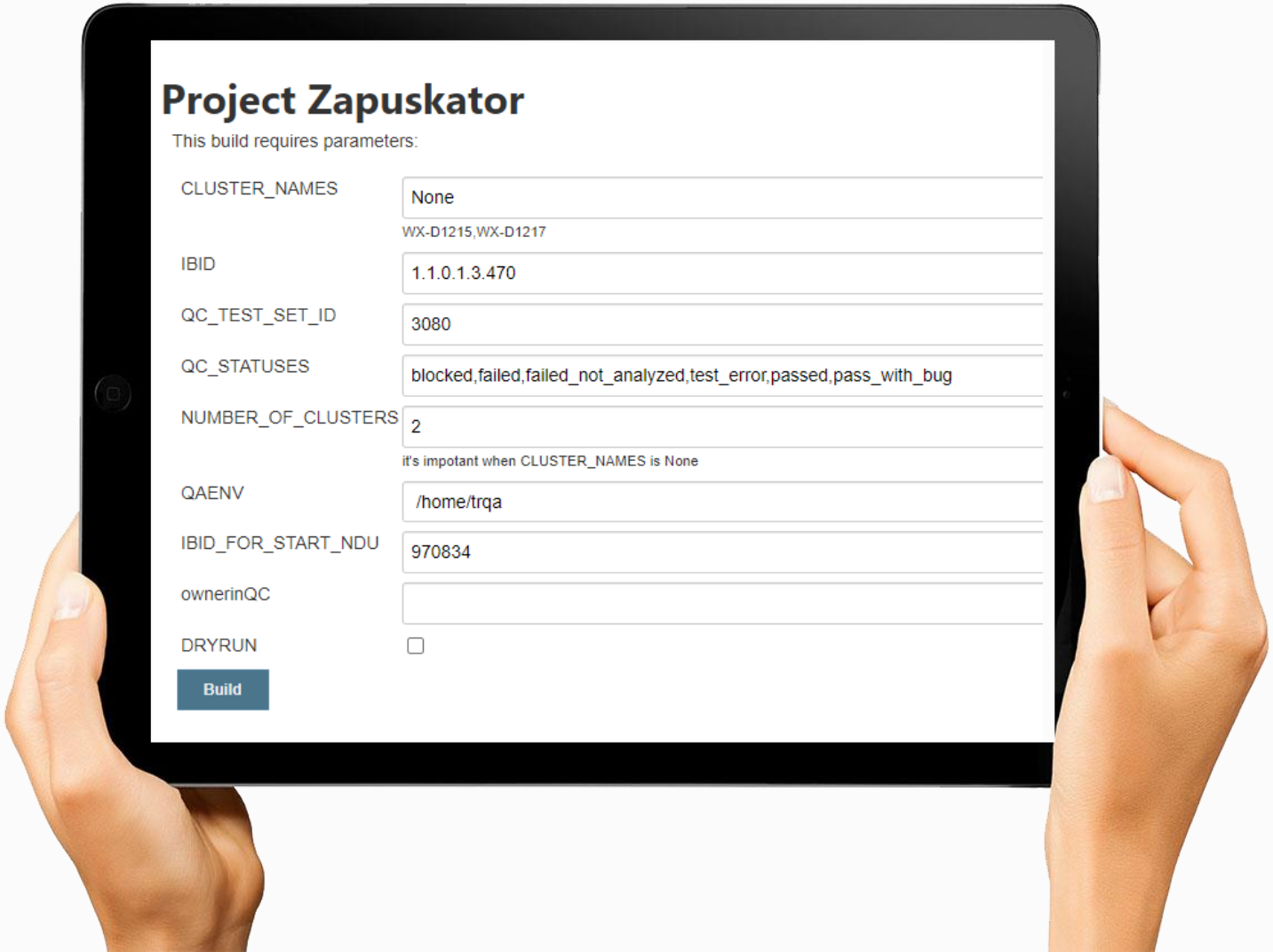


Zapuskator 1.0 prototype

Choose tests

Choose tests from test management system

Choose clusters

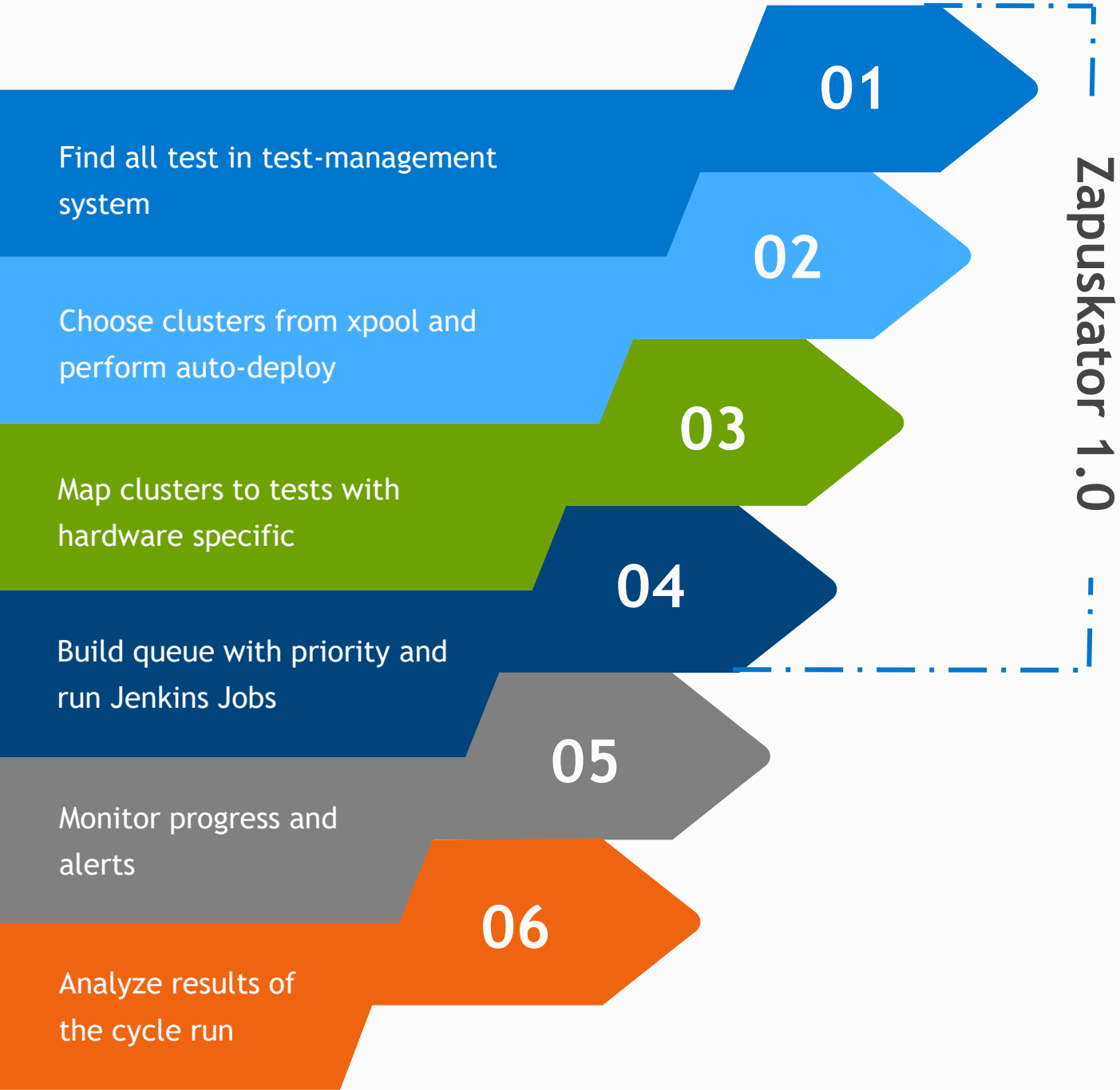
Choose clusters from xpool

Map clusters

Map clusters to tests

Build queue

Build queue and monitor execution



Process after third optimization

Zapuskator finds tests in test-management system per users request, automatically install clusters and prepares environments for chosen tests, then tests are assigned to cluster configurations and relevant Jenkins Jobs are started

2 weeks
cycle duration

History Timeline

PHASE 1:

Confluence + autotests

Manual environment preparation

PHASE 2:

Resource management tools + autotests

2w

Cycle duration

2 week

02.
Timeline

PHASE 3:

Resource management tools + autotests + jenkins with matrix plugin

CURRENT PHASE:

Resource management tools + autotests + jenkins with matrix plugin + zapuskator 1.0 tool

2w

Cycle duration

2 week

Process issues

Hardware downtime

Hardware downtime and lack of unique configurations

Manual

Manual mapping tests docs with autotests in Framework

Environment

A lot of manual intervention required like environment preparation

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Human factor

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Process issues

Hardware downtime

Hardware downtime and lack of unique configurations

Flexibility

Complexity of further development and growth

Environment

A lot of manual intervention required like environment preparation

Monitoring

Requires close monitoring on every step during test run

Reporting

Difficult progress monitoring and reporting for managers

Human factor

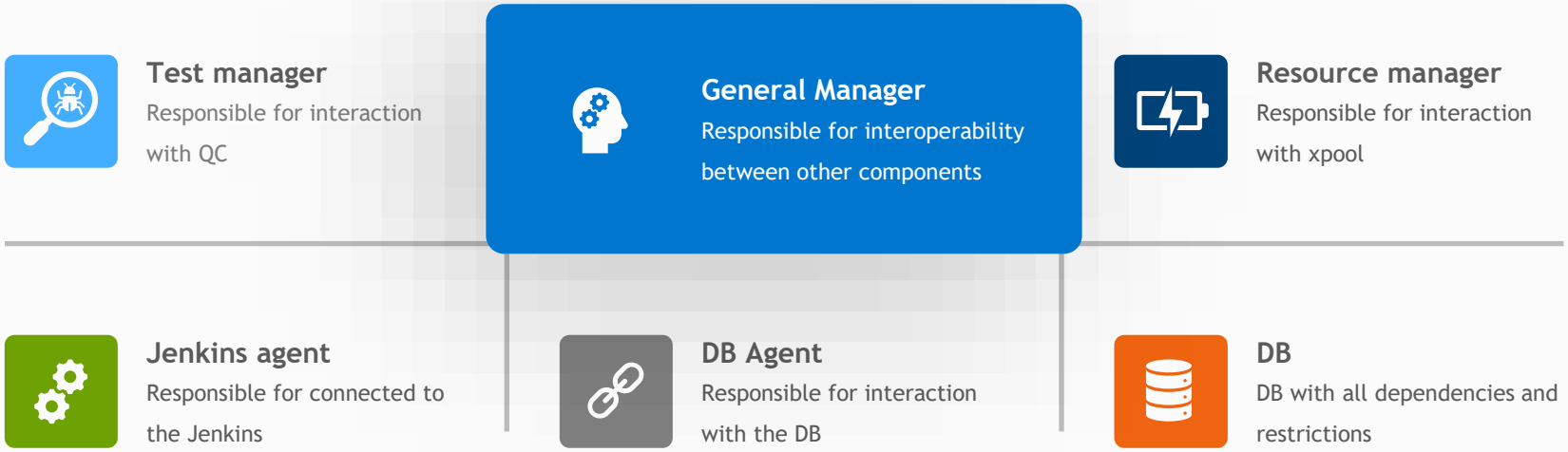
Strong influence of the human factor and golden resource problem

We wanted

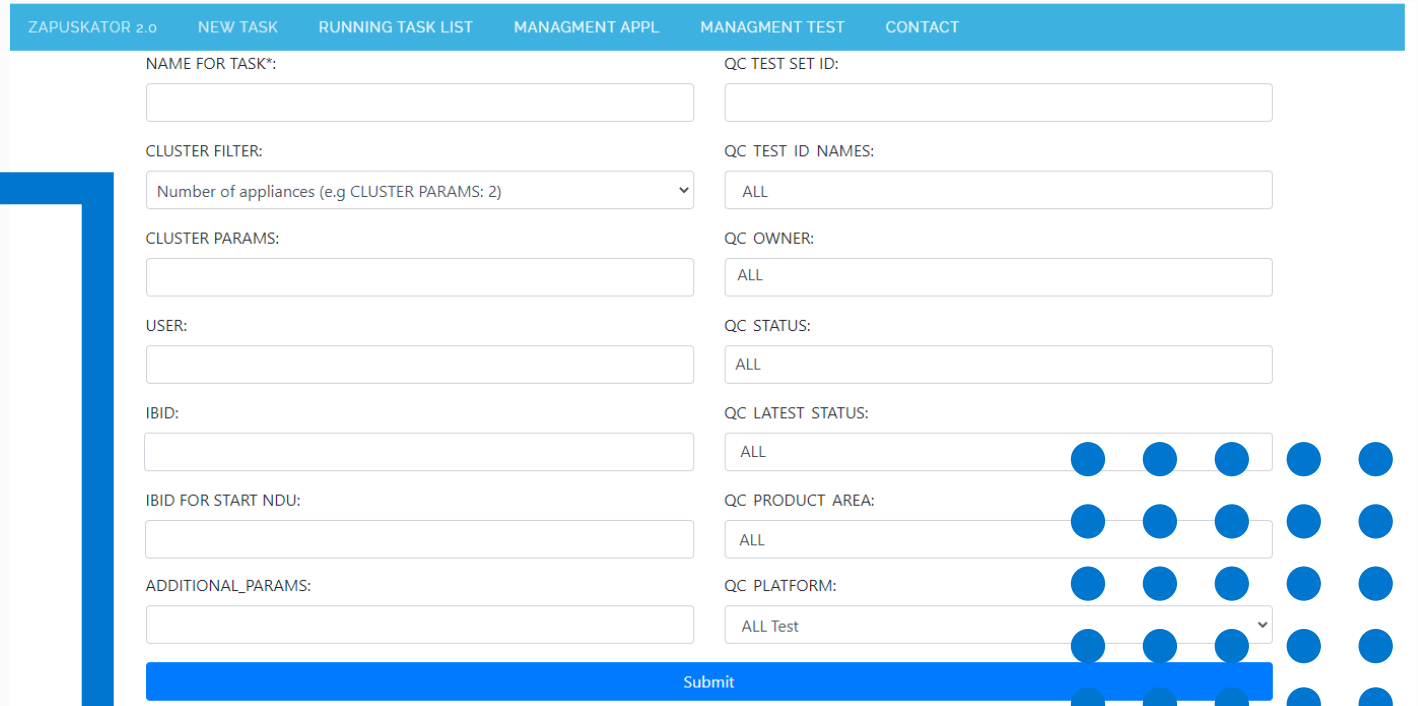
- **Any test**
  Run any test on correct cluster
- **Unlimited**
  Choose tests by unlimited number of parameters
- **Get info**
  Get info what clusters are missing for successful finish
- **Flexibility**
  Flexibility on start and during cycle run
- **Additional**
  Additional logic for choosing hardware resources / tests

Zapuskator 2.0 architecture

Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

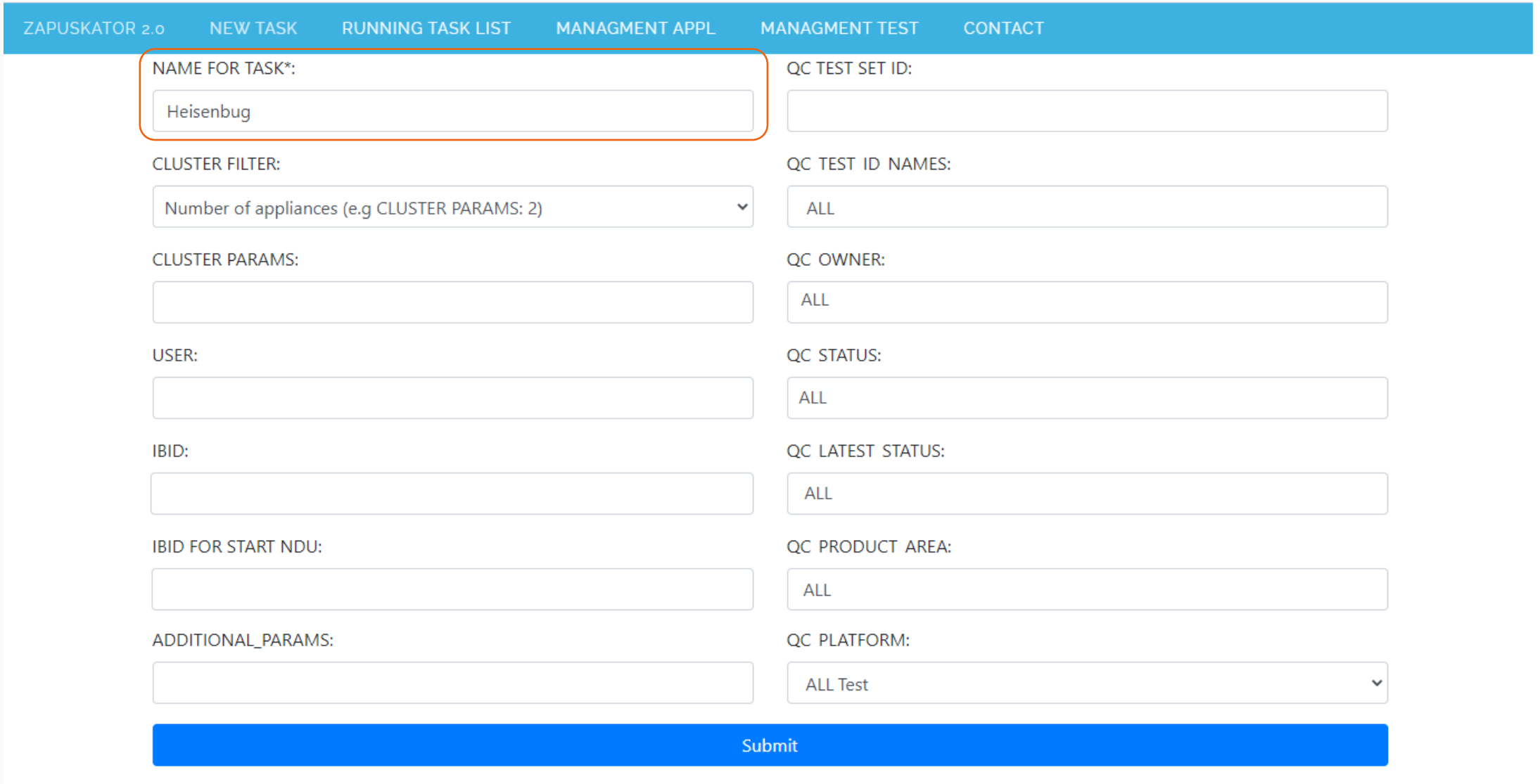


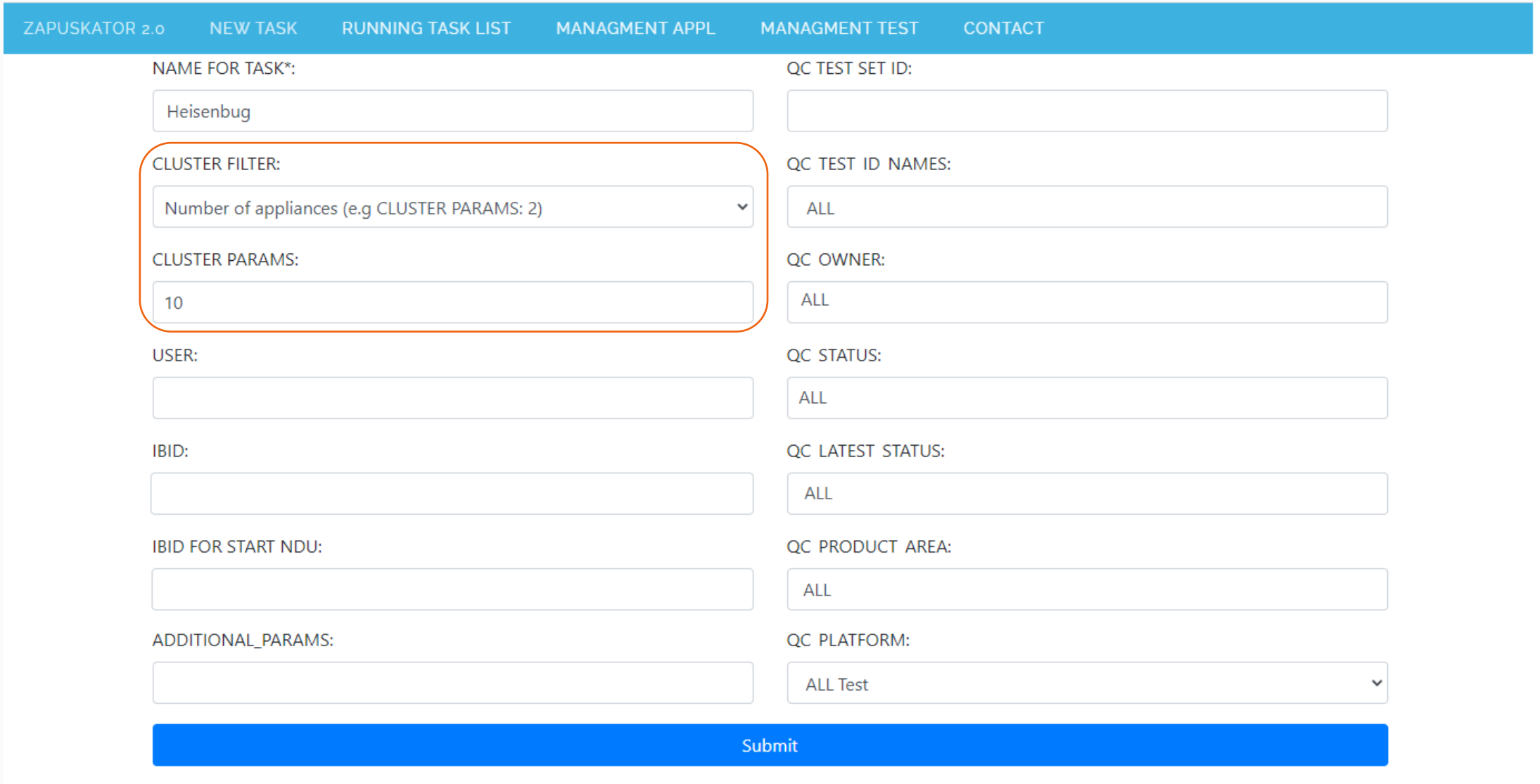
Zapuskator 2.0

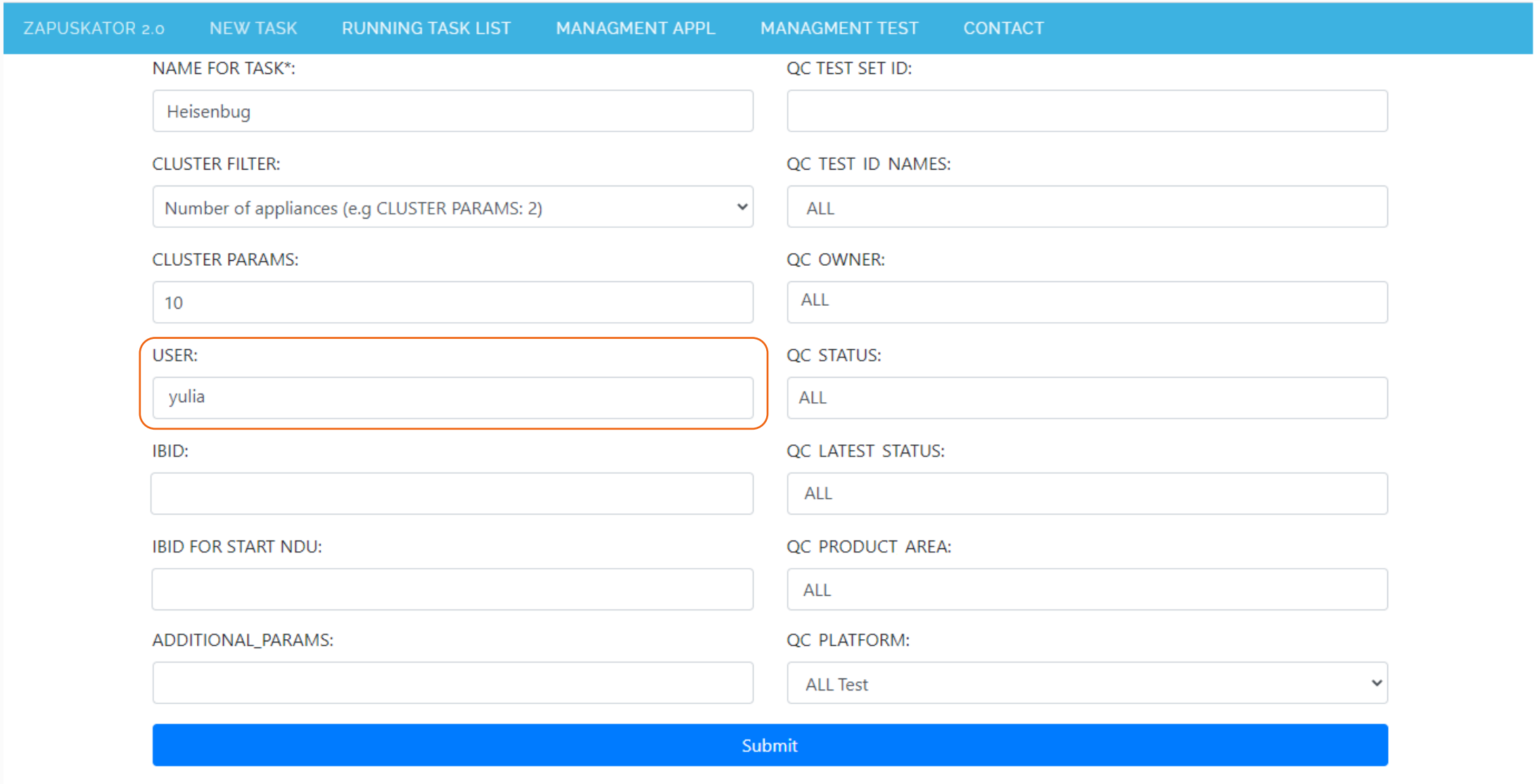


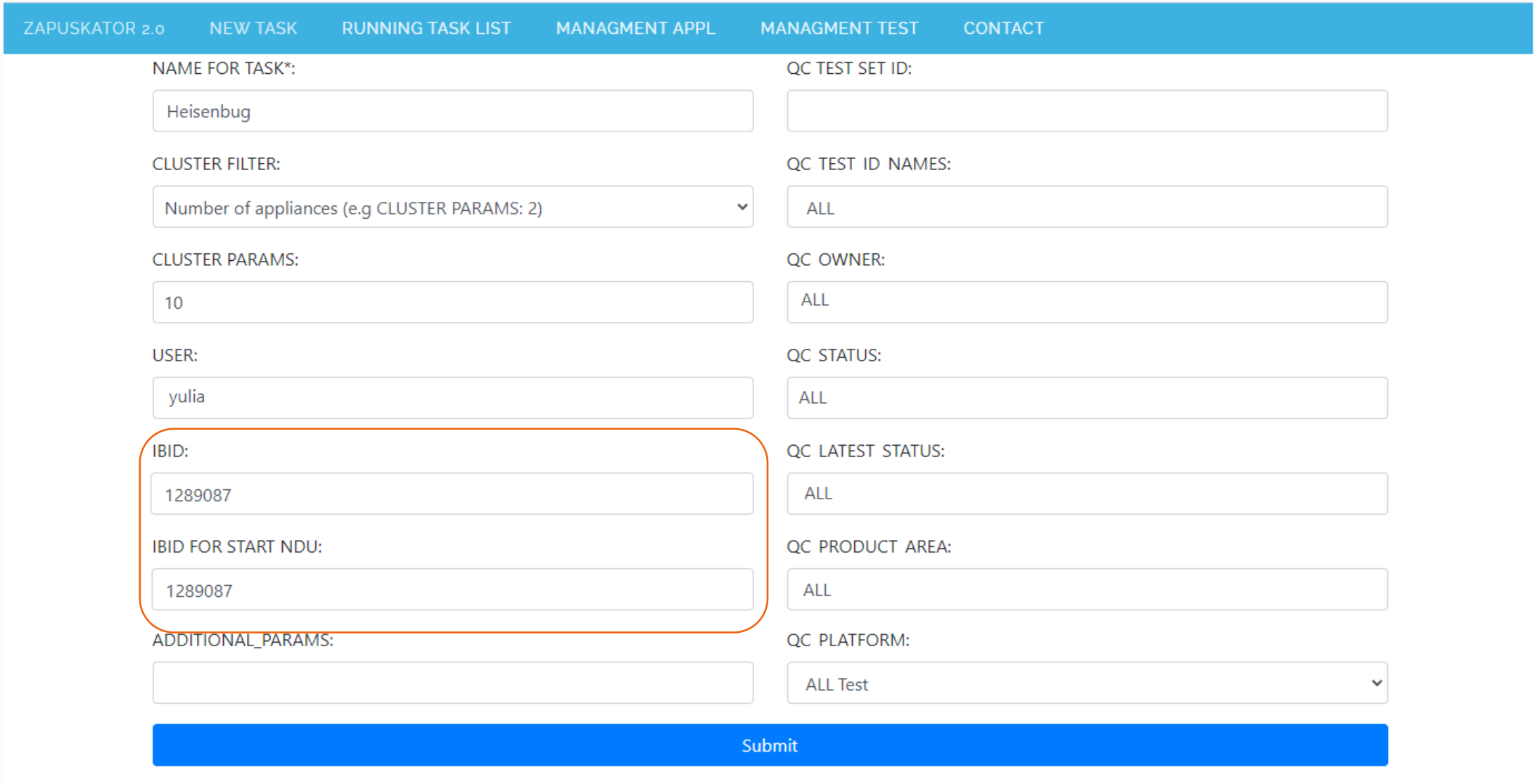
Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

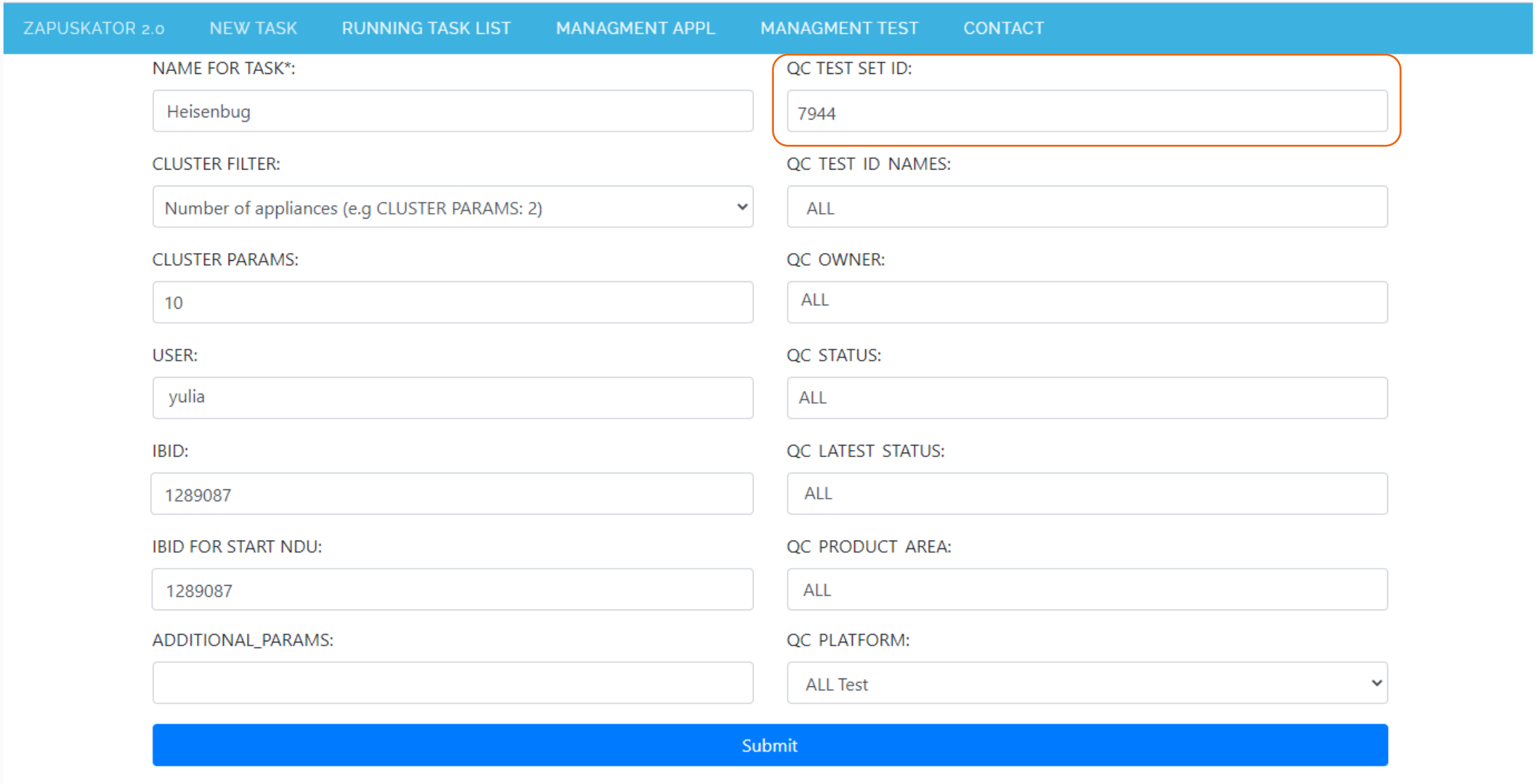

ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
QC TEST SET ID:
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
QC TEST ID NAMES:
ALL
CLUSTER PARAMS:
QC OWNER:
ALL
USER:
QC STATUS:
ALL
IBID:
QC LATEST STATUS:
ALL
IBID FOR START NDU:
QC PRODUCT AREA:
ALL
ADDITIONAL_PARAMS:
QC PLATFORM:
ALL Test
Submit

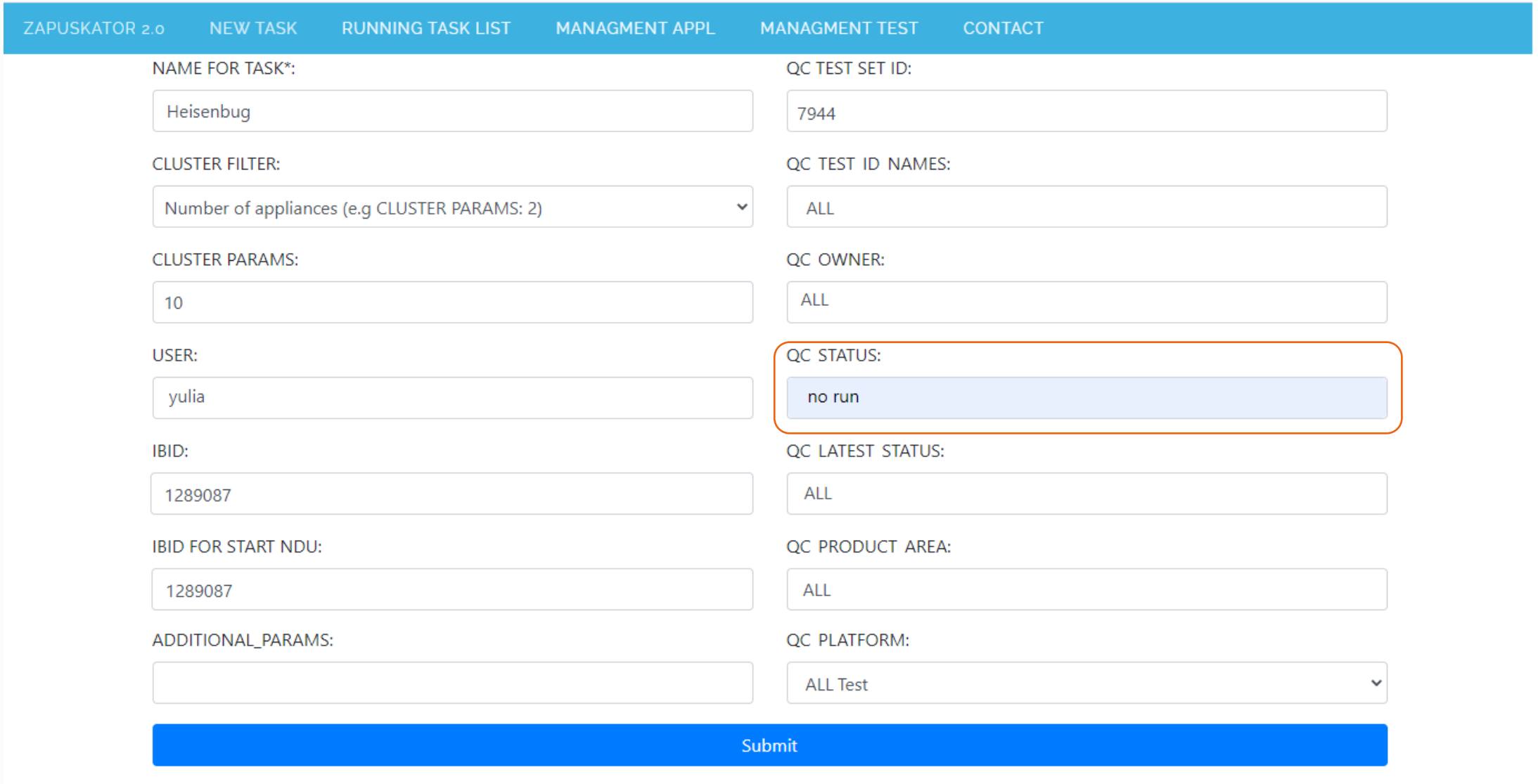

ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
QC TEST SET ID:
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
QC TEST ID NAMES:
ALL
CLUSTER PARAMS:
QC OWNER:
ALL
USER:
QC STATUS:
ALL
IBID:
QC LATEST STATUS:
ALL
IBID FOR START NDU:
QC PRODUCT AREA:
ALL
ADDITIONAL_PARAMS:
QC PLATFORM:
ALL Test
Submit


ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
CLUSTER PARAMS:
10
USER:
IBID:
IBID FOR START NDU:
ADDITIONAL_PARAMS:
QC TEST SET ID:
QC TEST ID NAMES:
ALL
QC OWNER:
ALL
QC STATUS:
ALL
QC LATEST STATUS:
ALL
QC PRODUCT AREA:
ALL
QC PLATFORM:
ALL Test
Submit


ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
CLUSTER PARAMS:
10
USER:
yulia
IBID:
IBID FOR START NDU:
ADDITIONAL_PARAMS:
QC TEST SET ID:
QC TEST ID NAMES:
ALL
QC OWNER:
ALL
QC STATUS:
ALL
QC LATEST STATUS:
ALL
QC PRODUCT AREA:
ALL
QC PLATFORM:
ALL Test
Submit


ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
CLUSTER PARAMS:
10
USER:
yulia
IBID:
1289087
IBID FOR START NDU:
1289087
ADDITIONAL_PARAMS:
QC TEST SET ID:
QC TEST ID NAMES:
ALL
QC OWNER:
ALL
QC STATUS:
ALL
QC LATEST STATUS:
ALL
QC PRODUCT AREA:
ALL
QC PLATFORM:
ALL Test
Submit


ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
QC TEST SET ID:
7944
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
QC TEST ID NAMES:
ALL
CLUSTER PARAMS:
10
QC OWNER:
ALL
USER:
yulia
QC STATUS:
ALL
IBID:
1289087
QC LATEST STATUS:
ALL
IBID FOR START NDU:
1289087
QC PRODUCT AREA:
ALL
ADDITIONAL_PARAMS:
QC PLATFORM:
ALL Test
Submit


ZAPUSKATOR 2.0
NEW TASK
RUNNING TASK LIST
MANAGMENT APPL
MANAGMENT TEST
CONTACT
NAME FOR TASK*:
Heisenbug
CLUSTER FILTER:
Number of appliances (e.g CLUSTER PARAMS: 2)
CLUSTER PARAMS:
10
USER:
yulia
IBID:
1289087
IBID FOR START NDU:
1289087
ADDITIONAL_PARAMS:
QC TEST SET ID:
7944
QC TEST ID NAMES:
ALL
QC OWNER:
ALL
QC STATUS:
no run
QC LATEST STATUS:
ALL
QC PRODUCT AREA:
ALL
QC PLATFORM:
ALL Test
Submit

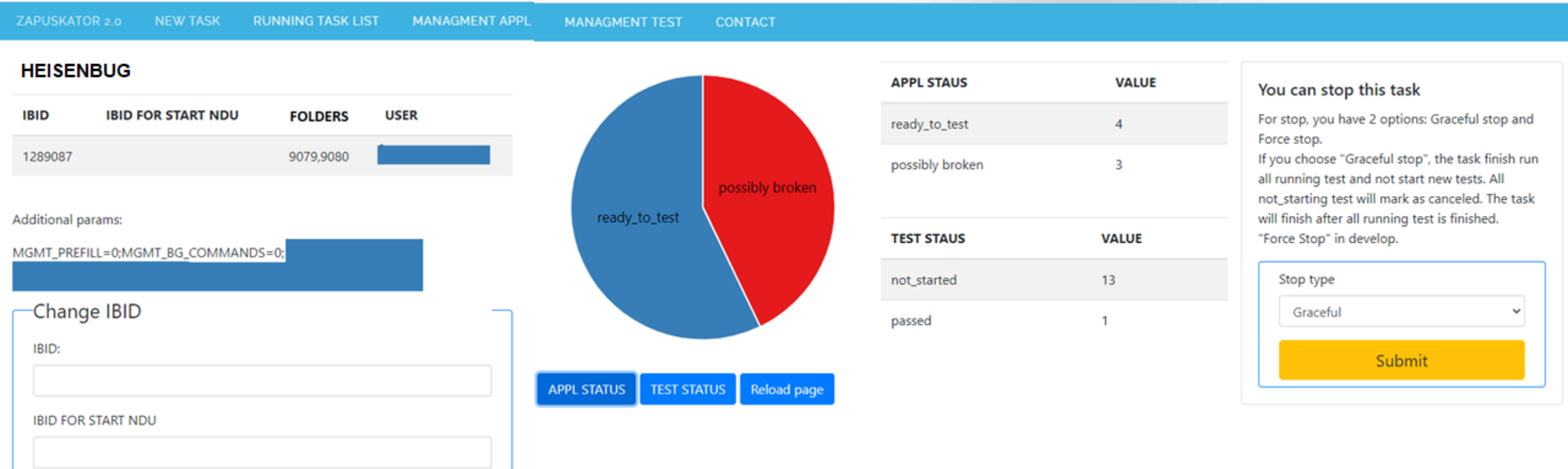
Zapuskator 2.0

Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

7 Clusters

14 Tests

1 Cycle



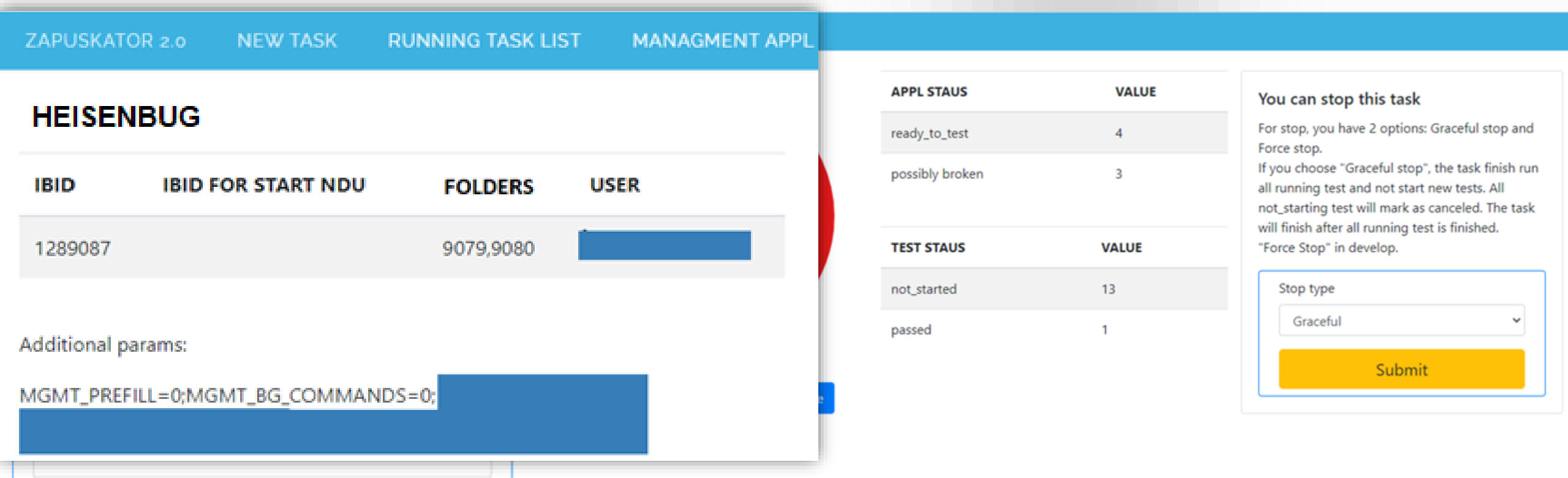
Zapuskator 2.0

Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

7 Clusters

14 Tests

1 Cycle



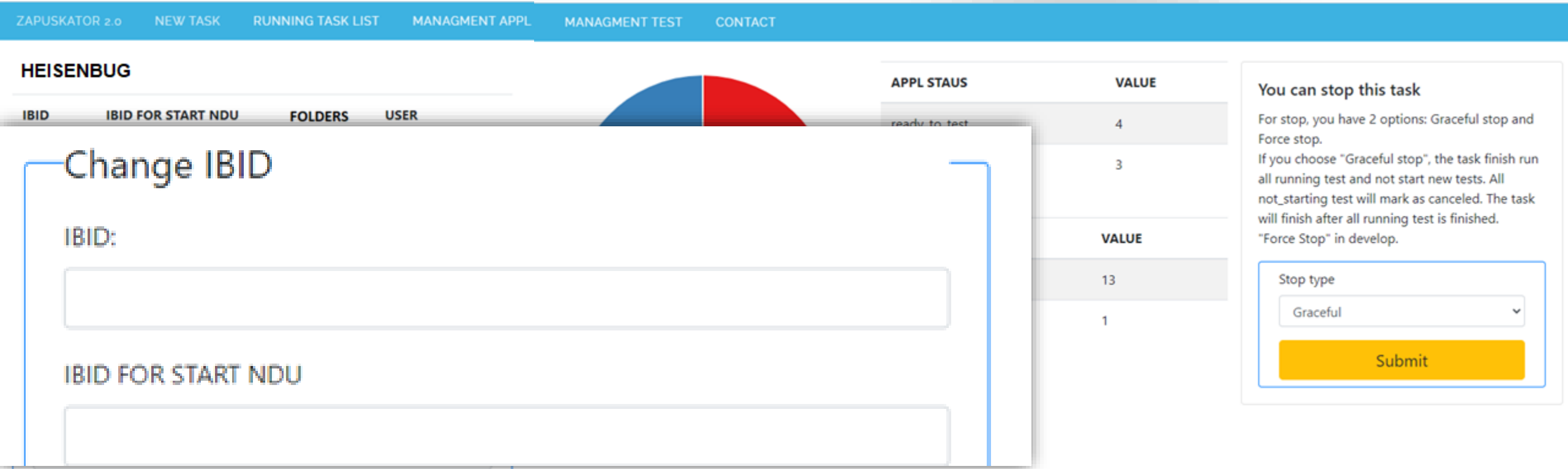
Zapuskator 2.0

Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

7
Clusters

14
Tests

1
Cycle

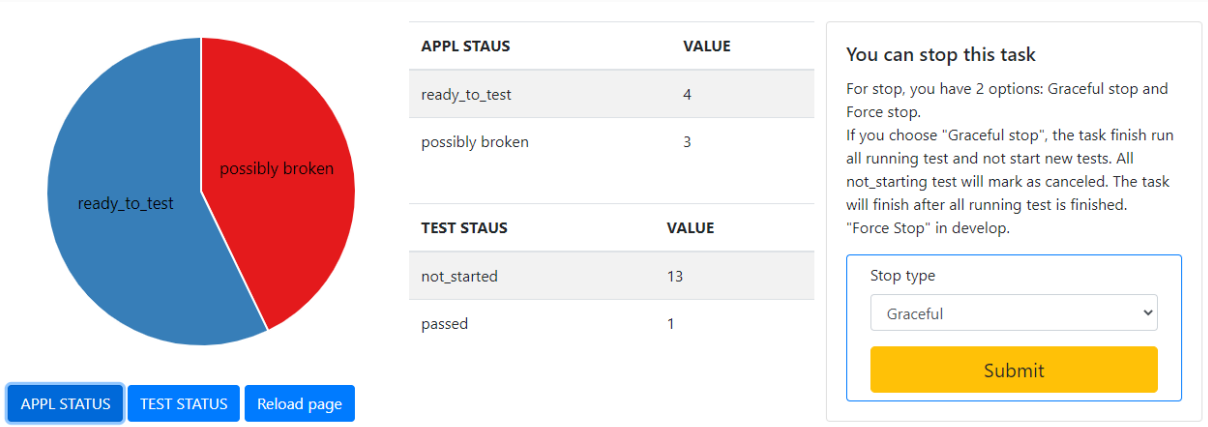


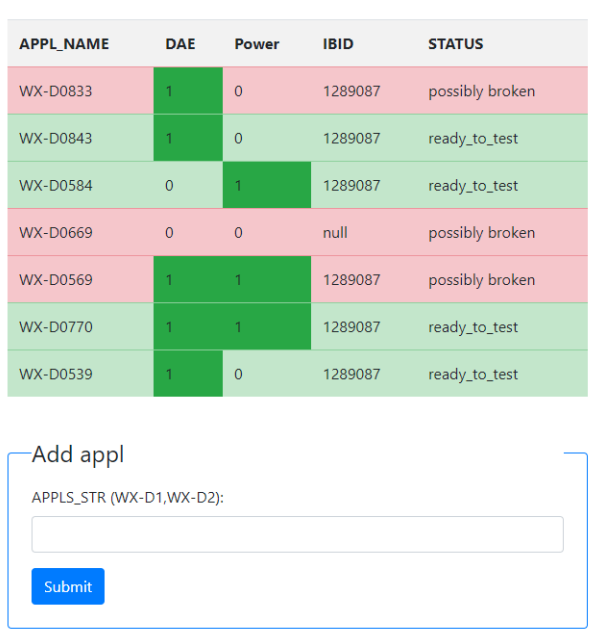
Zapuskator 2.0

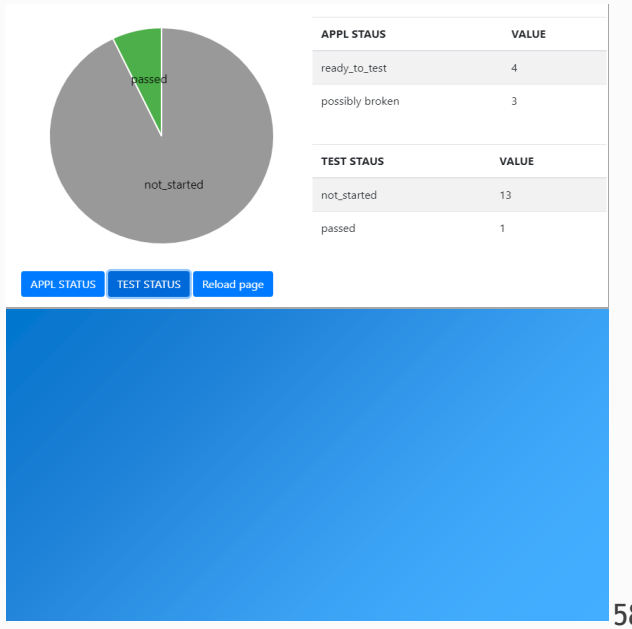
Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

50
Cycles Performed

4
Major Releases Delivered

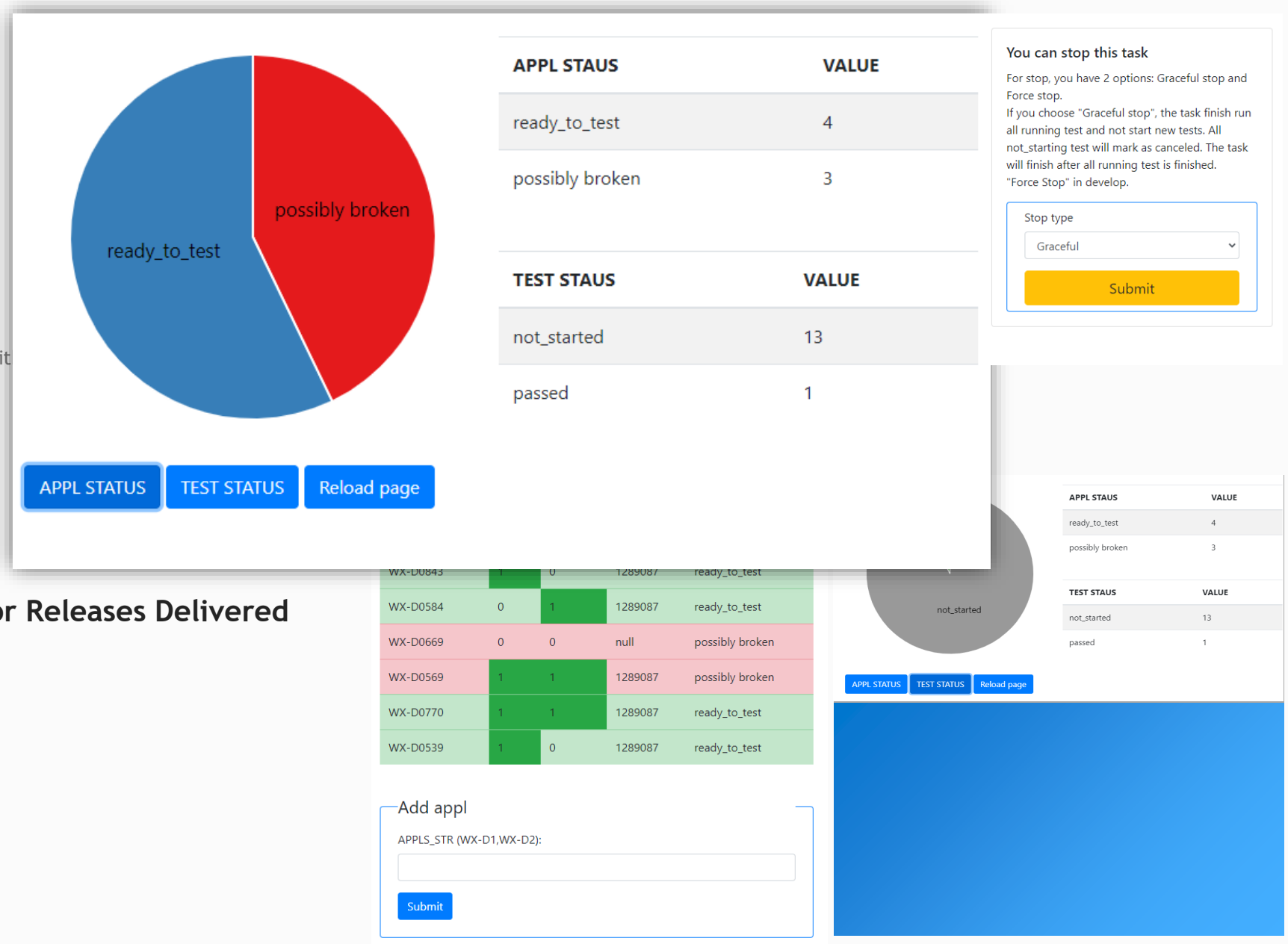






Zapuskator 2.0

Orchestrator tool for test cycle optimization wit
monitoring and reporting capabilities



50
Cycles Performed

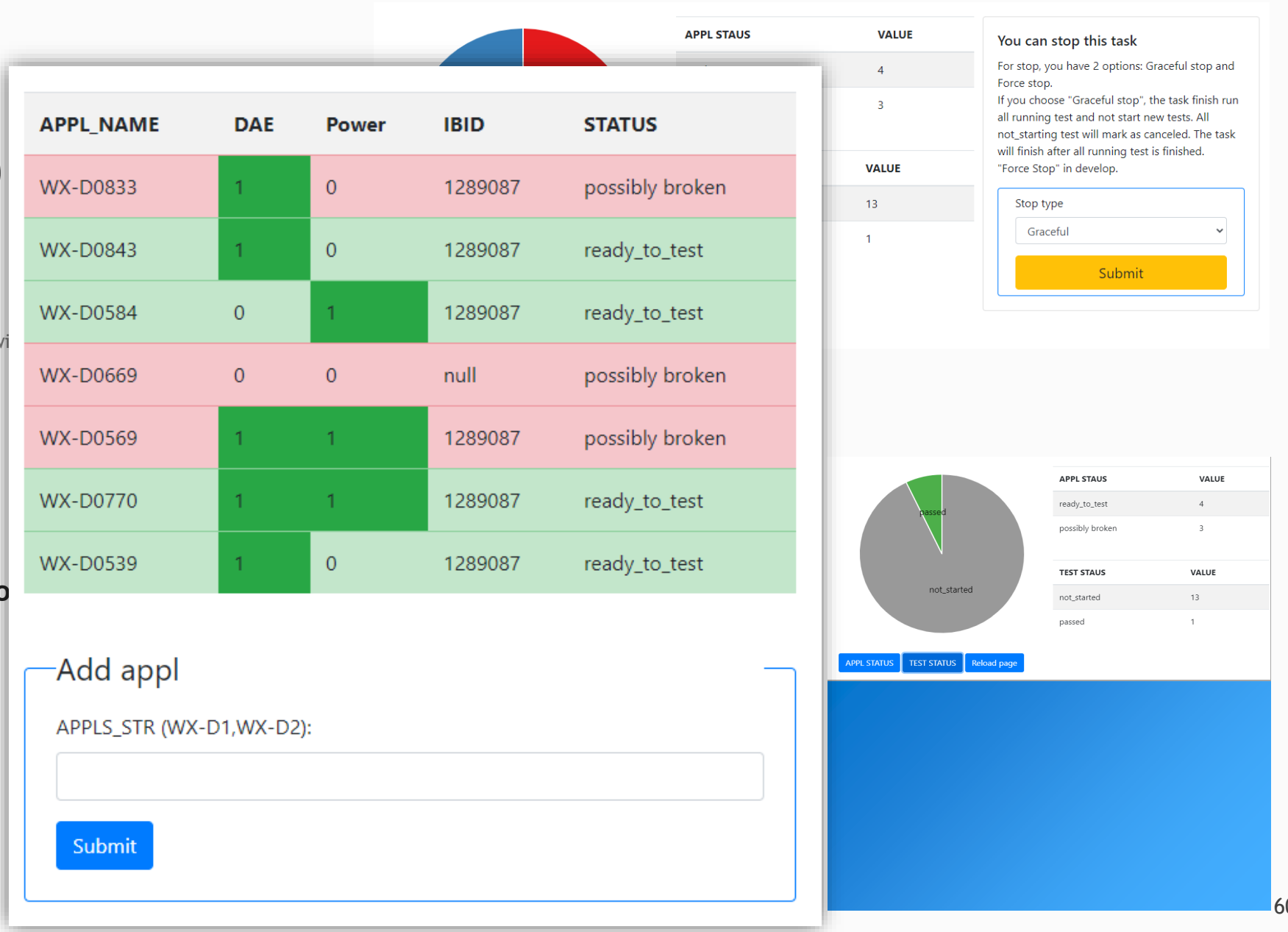
4
Major Releases Delivered

Zapuskator 2.0

Orchestrator tool for test cycle optimization wi
monitoring and reporting capabilities

50
Cycles Performed

4
Majo

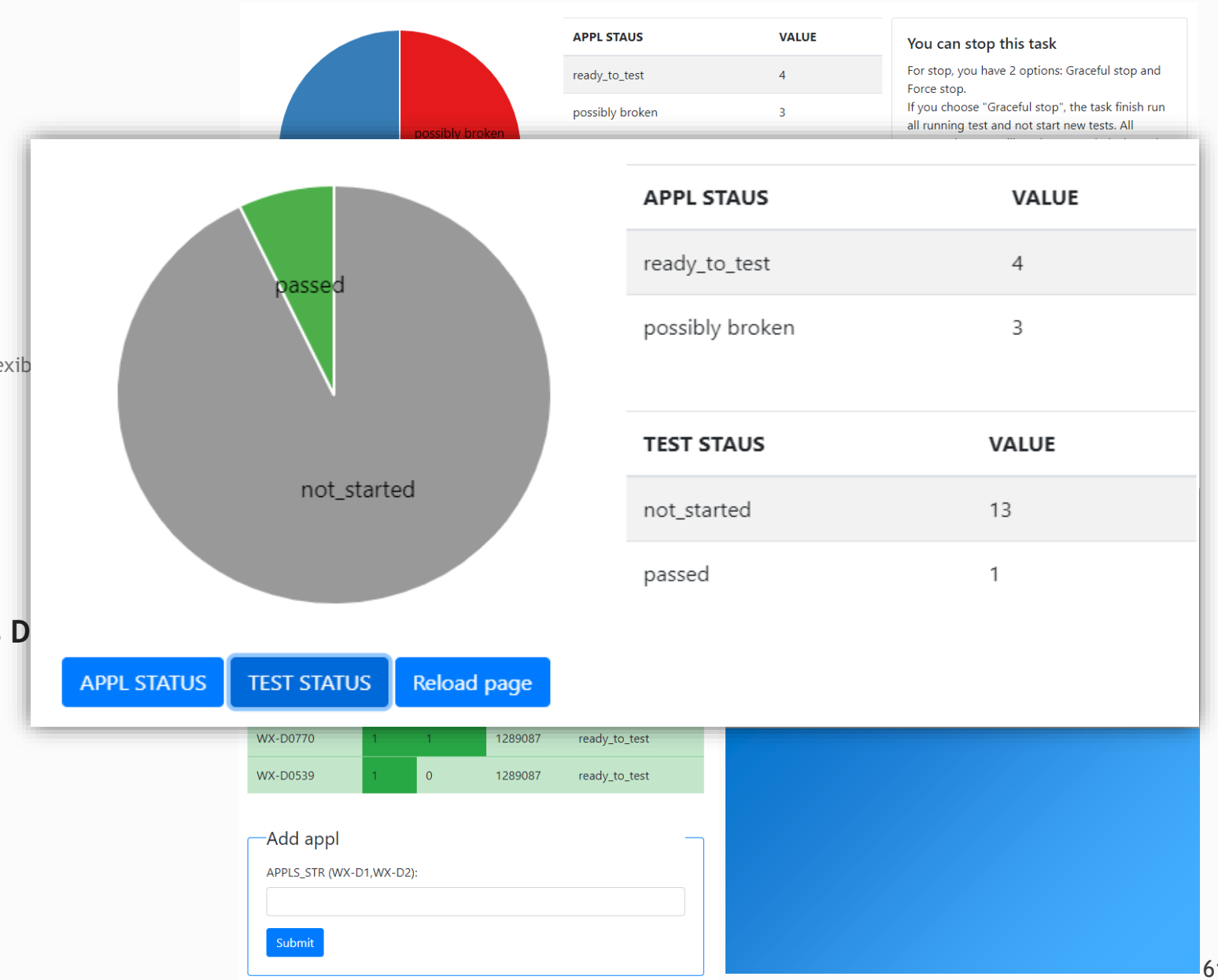


Zapuskator 2.0

Orchestrator tool for test cycle optimization with additional flexib
monitoring and reporting capabilities

50
Cycles Performed

4
Major Releases D

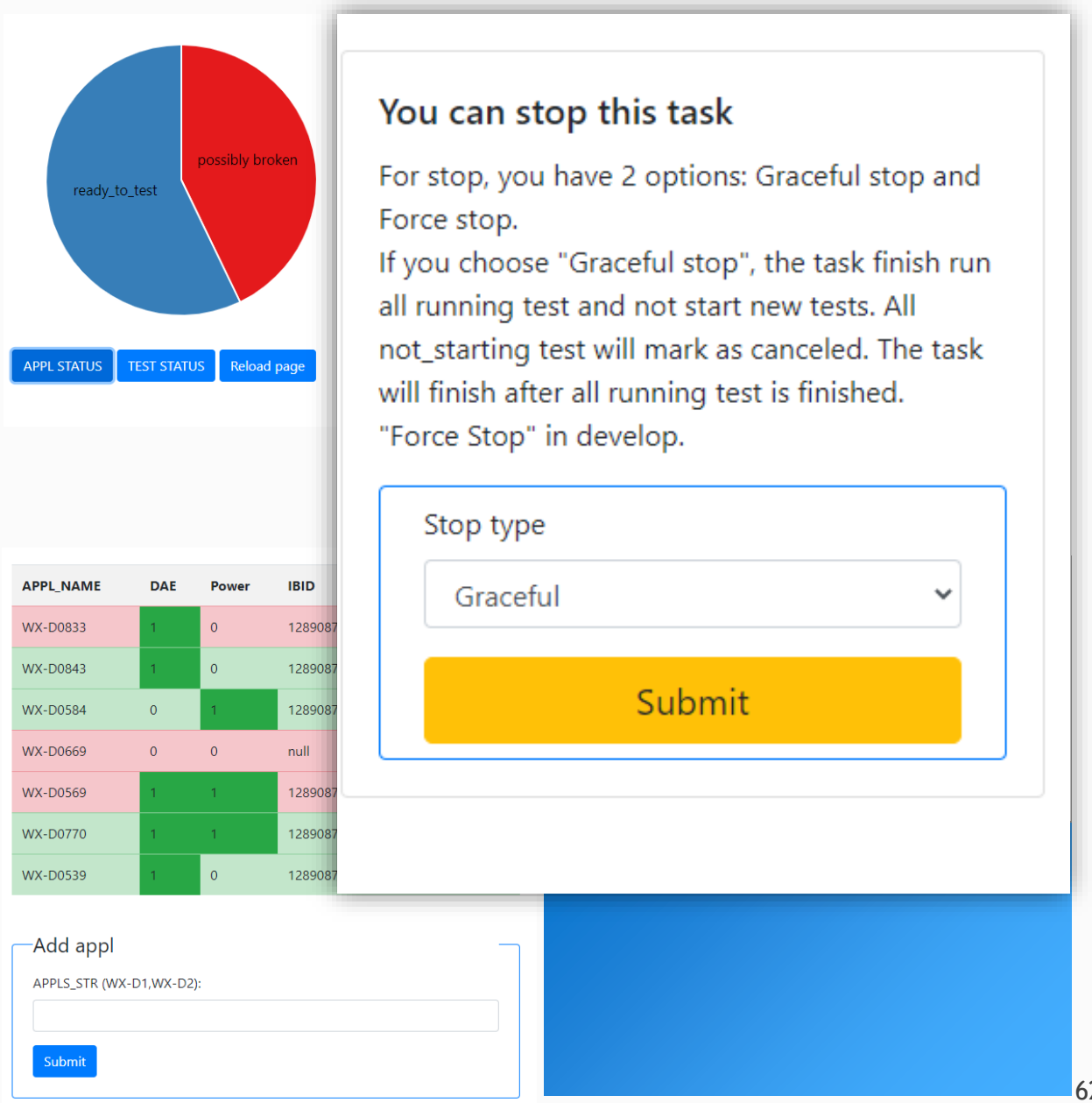


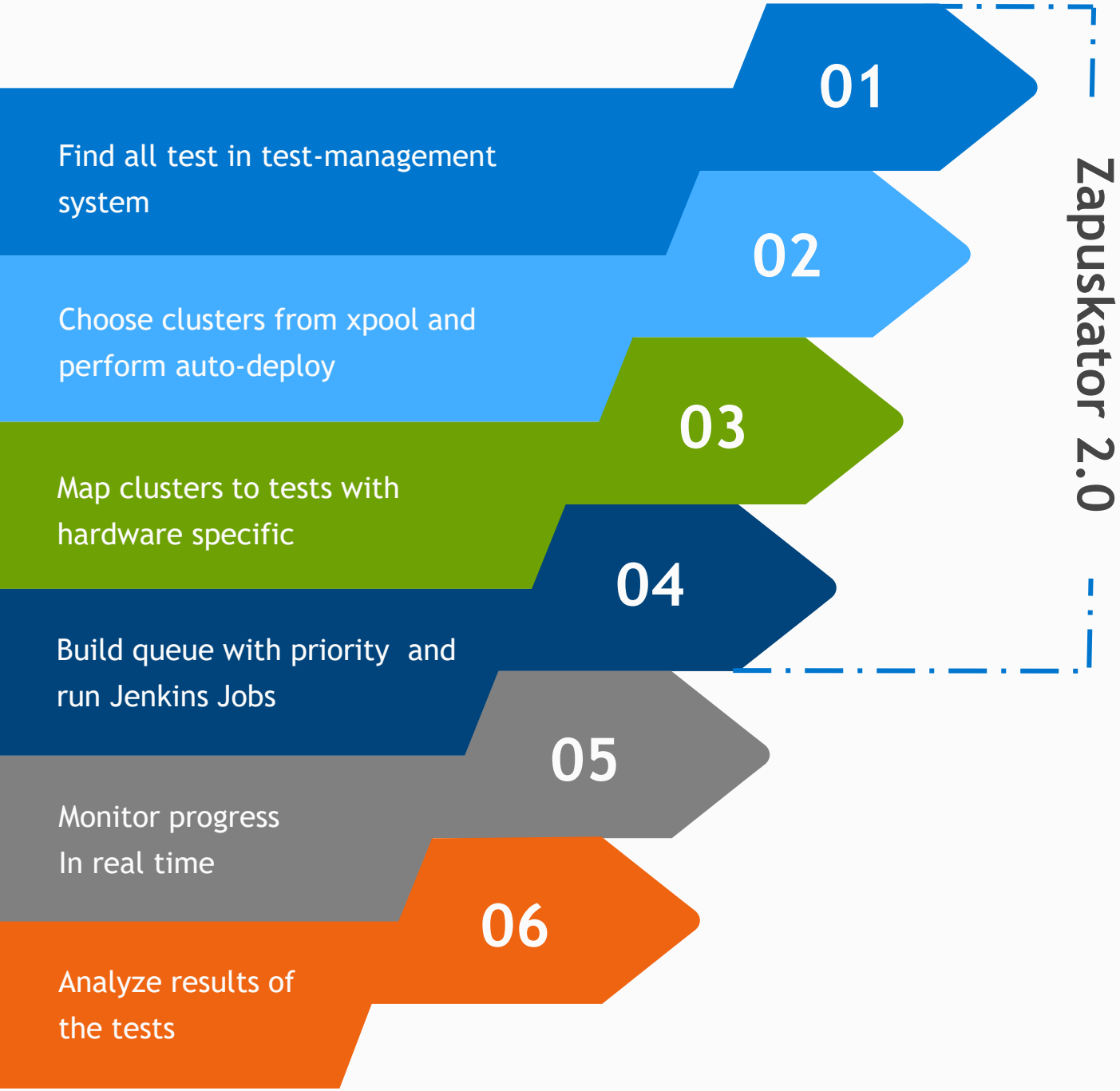
Zapuskator 2.0

Orchestrator tool for test cycle optimization with additional flexibility, monitoring and reporting capabilities

50
Cycles Performed

4
Major Releases Delivered





Process after fourth optimization

Zapuskator finds tests in test-management system per users request, automatically install clusters and prepares environments for chosen tests, then tests are assigned to cluster configurations and relevant Jenkins Jobs are started. The whole process is precisely monitored and alerts are sent at the very moment of issue occurrence so user can react promptly.

1 week
cycle duration

History Timeline

PHASE 1:

Confluence + autotests

Manual environment preparation

PHASE 2:

Resource management tools + autotests

1w

Cycle duration

1 week or less

02.
Timeline

PHASE 3:

Resource management tools + autotests + jenkins with matrix plugin

PHASE 4:

Resource management tools + autotests + jenkins with matrix plugin + zapuskator 1.0 tool

1w

Cycle duration

1 week or less

03.
Timeline

CURRENT PHASE:

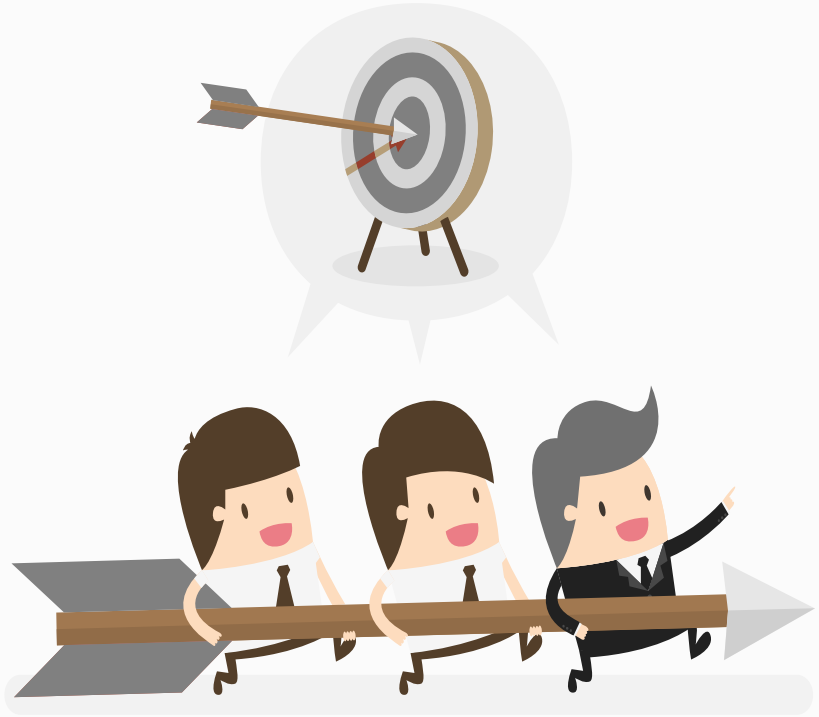
Resource management tools + autotests + jenkins with matrix plugin + zapuskator 2.0 tool

1w

Cycle duration

1 week or less

Process issues



Hardware downtime

Hardware downtime and lack of unique configurations

Flexibility

Complexity of further development and growth

Environment

A lot of manual intervention required like environment preparation

Monitoring

Requires close monitoring on every step during test run

Reporting

Difficult progress monitoring and reporting

Human factor

Strong influence of the human factor and golden resource problem

Further plans

- SCALE TO OTHER PROJECT
- AI LEARNING
- INTEGRATION WITH BUILD SYSTEM

Thank for your time