



BANCA D'ITALIA
EUROSISTEMA

Continuous availability: from the shift paradigm
to unmanned operation.



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Agenda

1

Introduction

2

Continuous
Availability

3

Results

4

Conclusions and
perspective

Introduction

TIPS Non functional requirements - Reliability / Availability



99.9%



(RPO=0)

Transactions Lost

(RTO=15 minutes)

Downtime

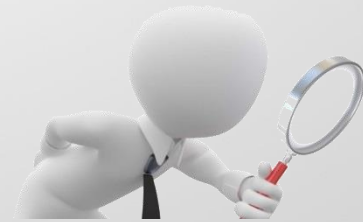
Introduction

Datacenter Operations

Human based
(on shifts)



Unmanned



CONTINUOUS OPERATION



Continuous Availability

From high availability to continuous availability

- Redundancy
- Fault Tolerance
- Clustering
- Active Active configuration



- Proactive monitoring
- Continuous delivery
- Automatic remediation
- Dynamic capacity management

Continuous Availability

Proactive Monitoring

- Application monitoring



- Infrastructure monitoring



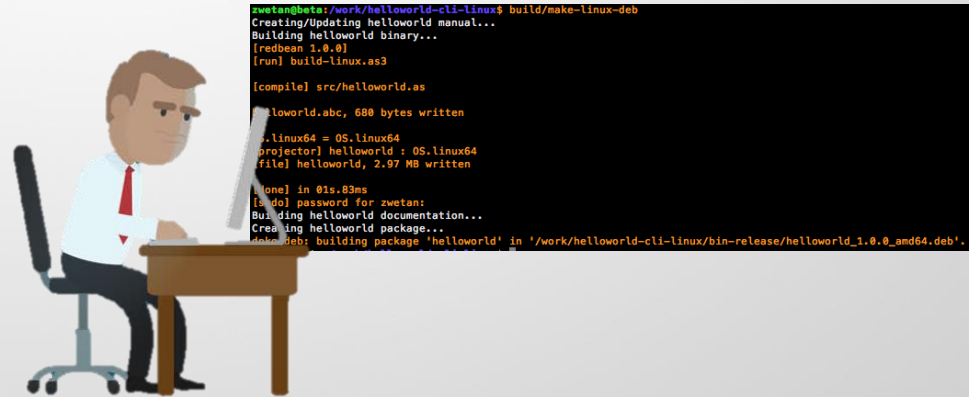
- Detect events before failures

- Analyze the event

- Trigger automatic actions

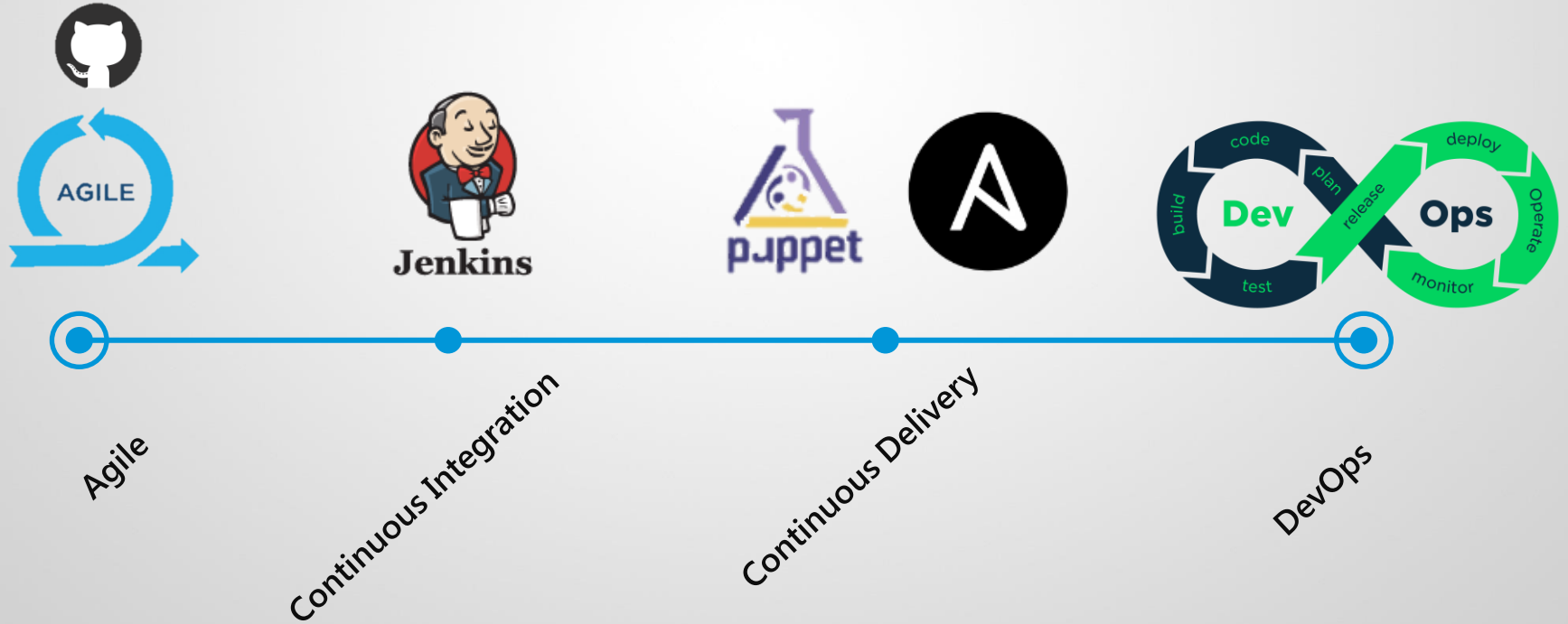
Continuous Availability

IT Automation



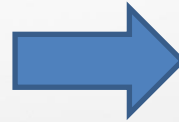
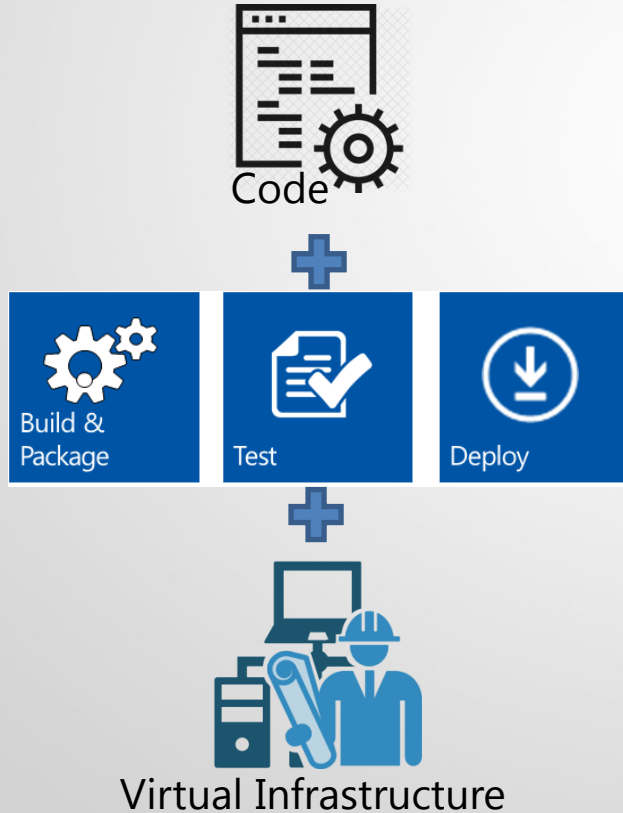
Continuous Availability

From Agile to Devops



Continuous Availability

DevOps - Everything as Code



```
    'role_id'      => $role_details['id'],
    'resource_id' => $resource_details['id'],
  );
if ( $this->rule_exists( $resource_details['id'], $role_details['id'] ) ) {
  if ( $access == false ) {
    // Remove the rule as there is currently no need for it
    $details['access'] = ! $access;
    $this->_sql->delete( 'acl_rules', $details );
  } else {
    // Update the rule with the new access value
    $this->_sql->update( 'acl_rules', array( 'access' => $access ) );
  }
}
foreach( $this->rules as $key=>$rule ) {
  if ( $details['role_id'] == $rule['role_id'] && $details['resource_id'] == $rule['resource_id'] ) {
    if ( $access == false ) {
      unset( $this->rules[ $key ] );
    } else {
      $this->rules[ $key ]['access'] = $access;
    }
  }
}
```

Continuous Availability

Dynamic Capacity Management

- Resource utilization rate optimization

MONITORING



ANALYZING



CAPACITY
MANAGEMENT

CHANGE



MODELING



OPTIMIZING



- Consumption trend analysis

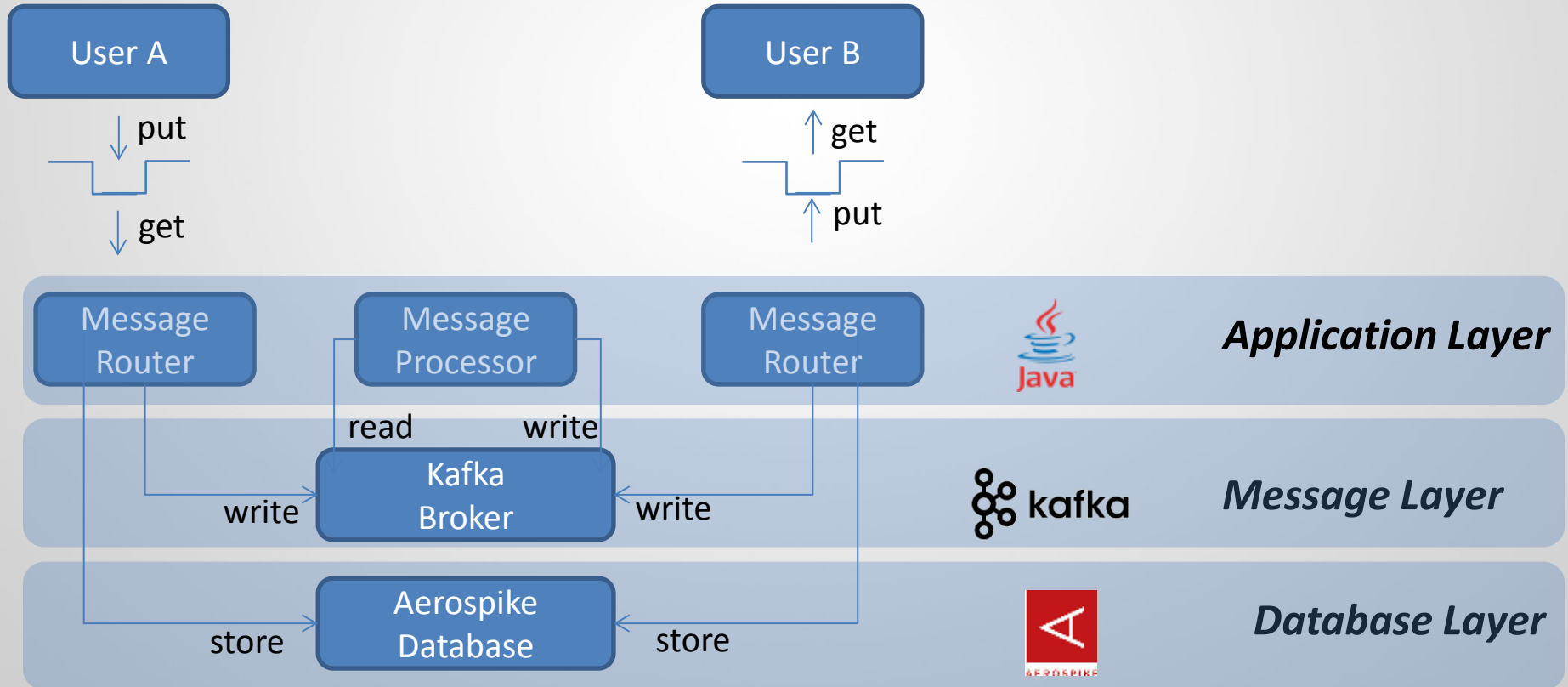
- What if scenarios

- Predict future requirements and trends



Test Plant

Architecture



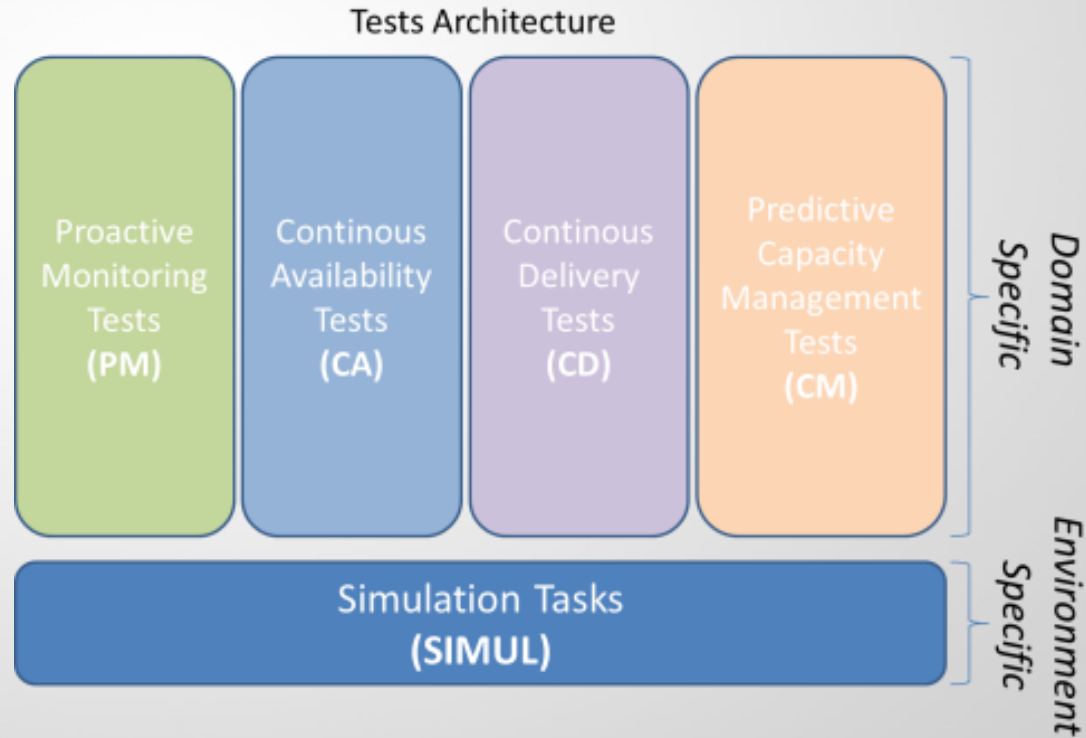
Results

Test Architecture

Specific tests to verify the relevant domain functions.

executed on

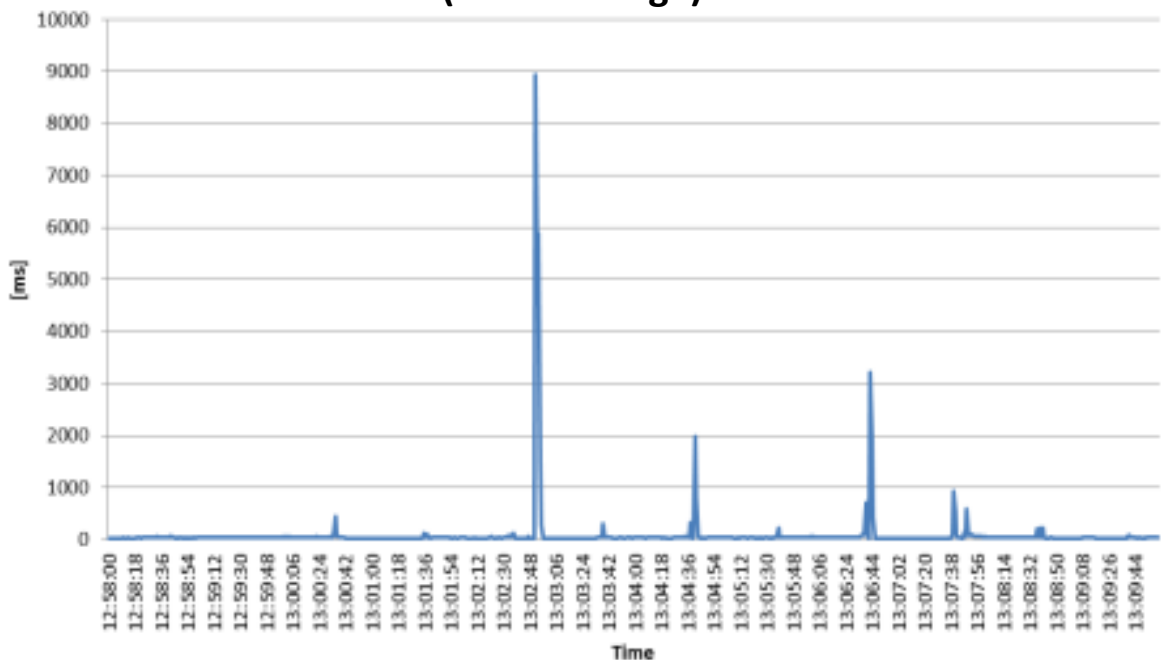
Common simulation layer to reproduce real operational environment.



Results

Simulation – continuous delivery (1)

**SIMUL.APP.01 : message latency
(1 sec average)**



Normal traffic condition (500 msg/s), timeout = 10.000 ms

Kafka cluster rolling update

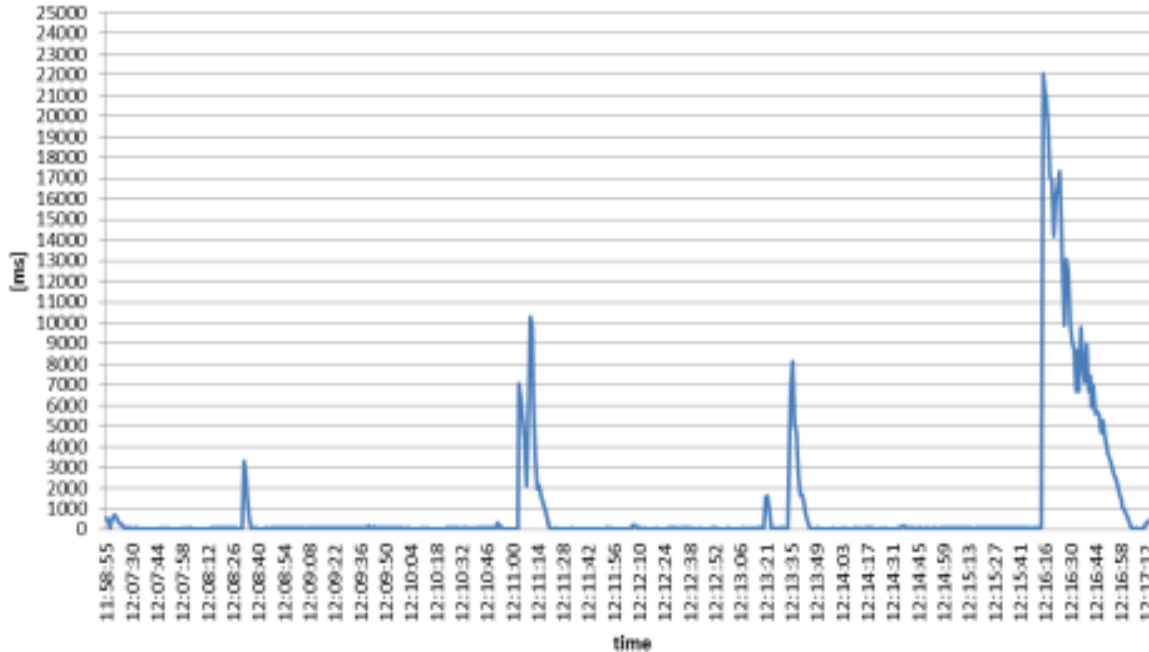
0 messages lost

0 timeout expired

Results

Simulation – continuous delivery (2)

**SIMUL.APP.02 : message latency
(1 sec average)**



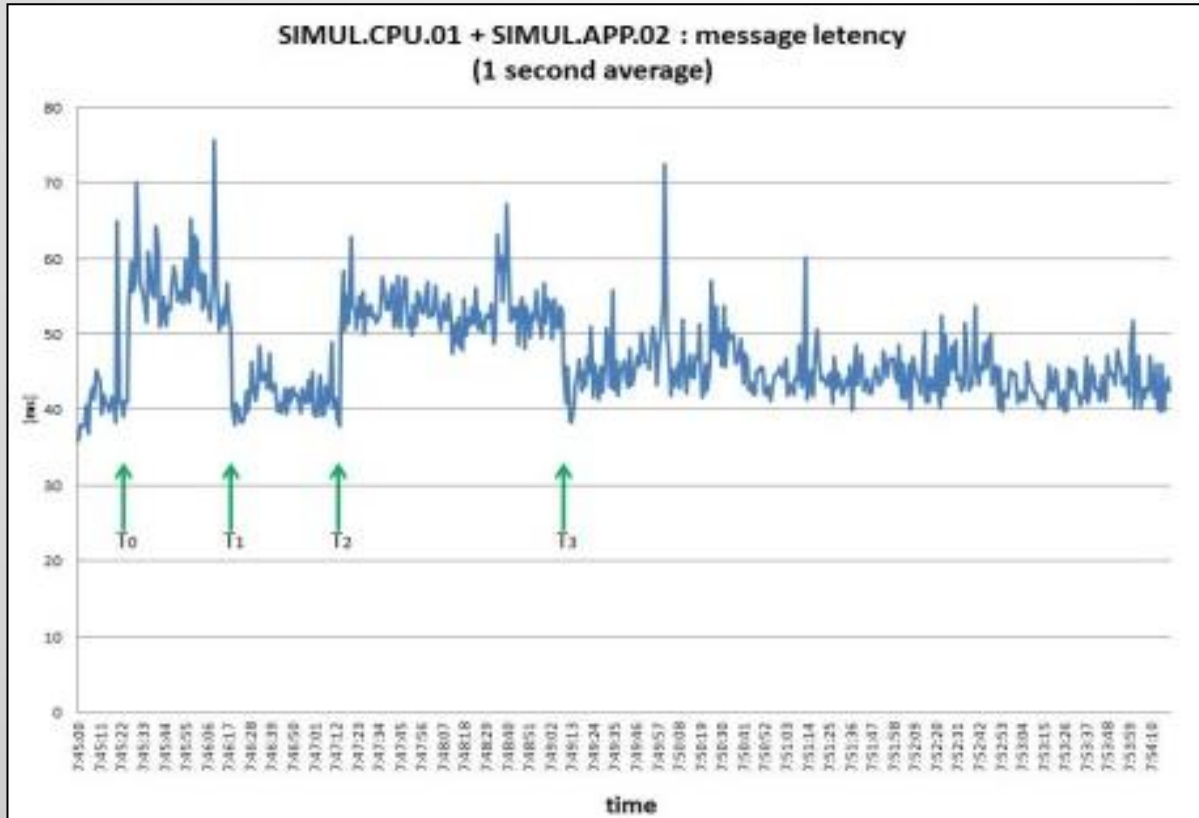
Heavy traffic condition (2000 msg/s), timeout = 10.000 ms

Kafka cluster rolling update

0 messages lost
some timeout expired

Results

Simulation – proactive monitoring



Normal traffic condition (500 msg/s)
average E2E processing time = 45 ms

High vCPU load added to Message Processor nodes.

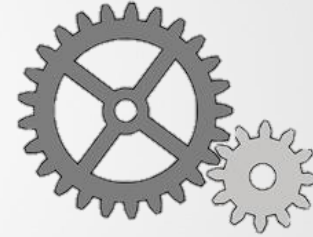
T0-T1 → **below** threshold

T2-T3 → **exceed** threshold

Conclusions and perspective



Phased
Approach



Bi-modal
Data Center



Tool



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Thanks for your attention

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