Extended Task Resubmission

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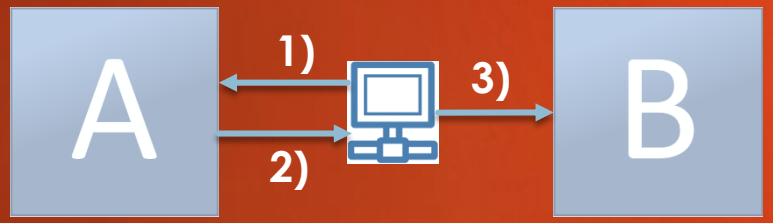
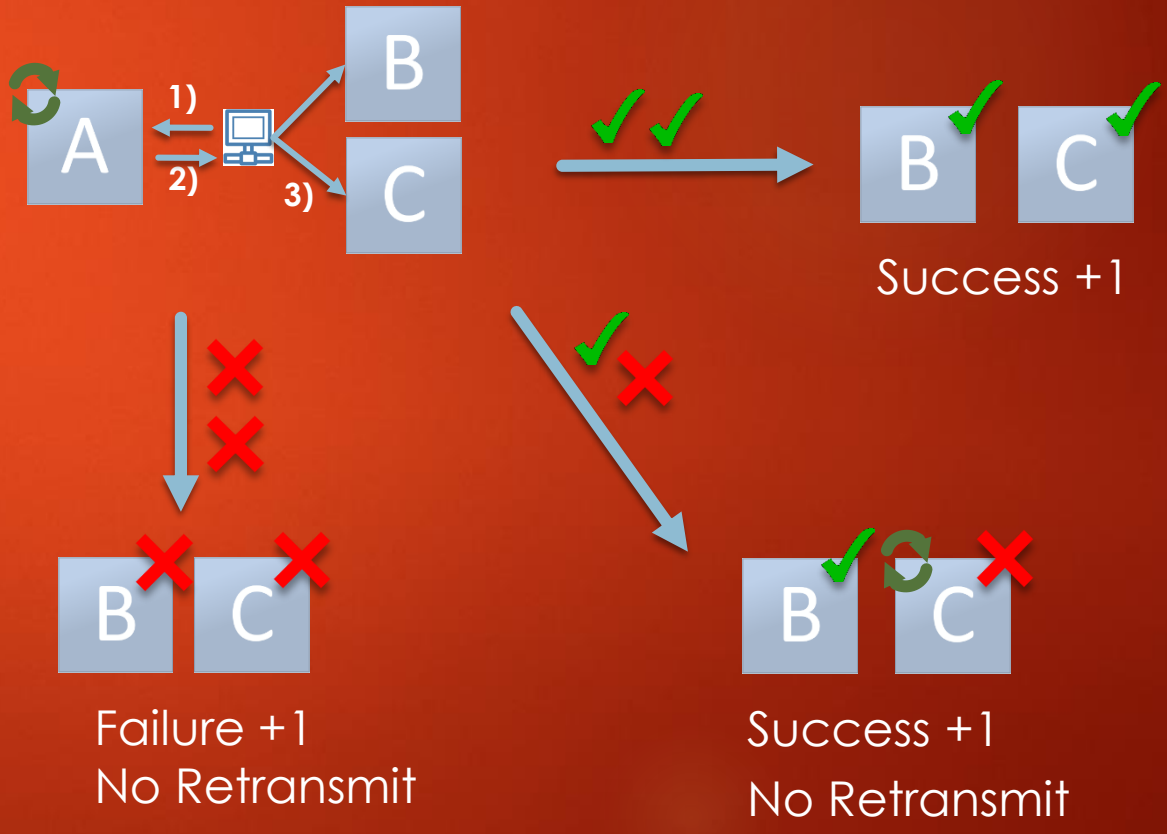
Content

Overview

- Baseline:

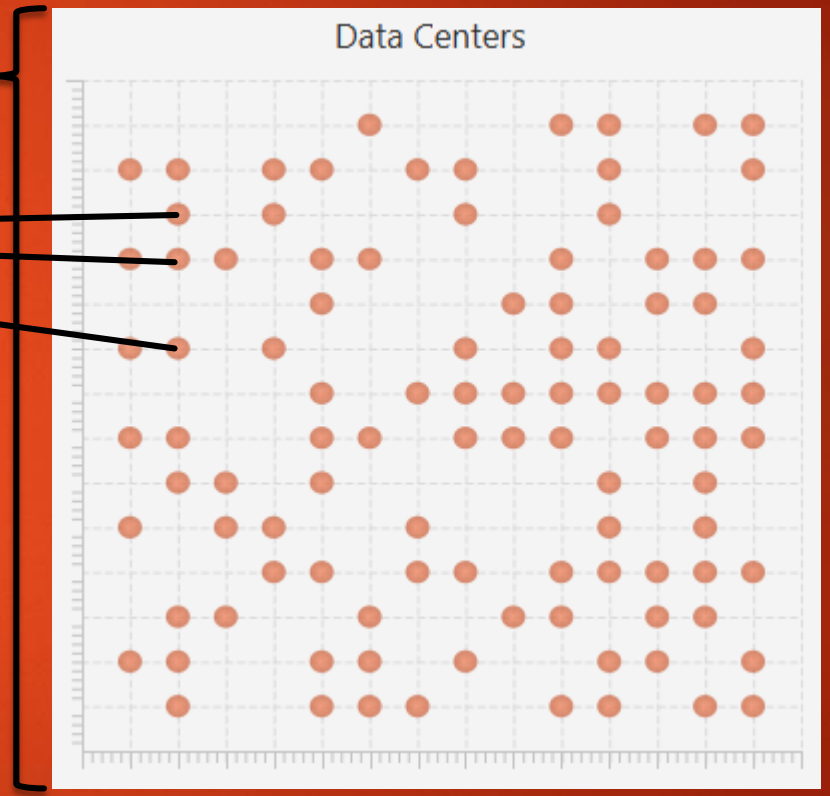


- Extension:



Architecture

- Grid
  - Fixed Size
- Datacenter (DC)
  - Randomly Distributed
- Physical Machine (PM)
  - Fixed Number / DC
  - CPU, Memory, Bandwith
- Virtual Machine (VM)
  - Shares Memory of a PM
  - 1 Job at a Time
- Job
  - Gaussian Distributed Execution Time



Implementation

- Job
  - Single Thread Using *Thread.sleep()* as „Operating Time“
  - Probability of Failing Determined by Job & VM
  - Assigned by Controller without latency
- Migrations
  - Minimize Latency
    - Checking for „Free“ PM in Same DC
    - Choosing Next DC by Comparing Bandwith
    - Job transfer to new DC → Latency
- Increasing Failure Rate
  - After Every Job to a Given Limit
  - Reset to „0“ After Reboot (Not available in Baseline)

Setup

Default

- gridSize = 5
- numberOfDataCenters = 10
- numberOfPhysicalMachines/DC = 10
- basicEnergyUtilization = 5
- memoryPerPM = 10
- pMmemory = 5000
- RestartDuration = 10000
- Failure Rate = 2 %

Modified Successrate

- gridSize = 5
- numberOfDataCenters = 10
- numberOfPhysicalMachines/DC = 10
- basicEnergyUtilization = 5
- memoryPerPM = 10
- pMmemory = 5000
- RestartDuration = 10000
- **Failure Rate = 40 %**

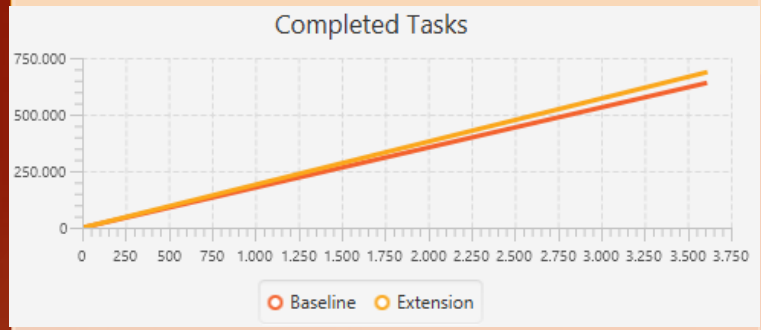
Modified Scale

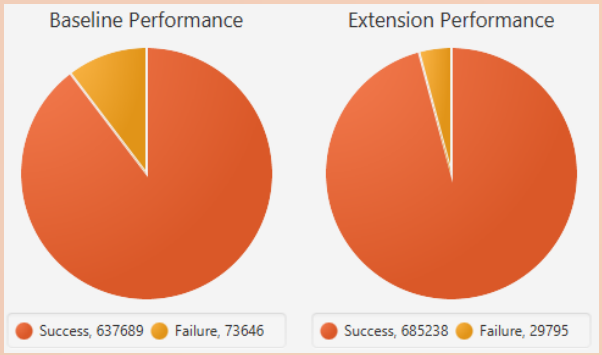
- **gridSize = 10**
- **numberOfDataCenters = 25**
- **numberOfPhysicalMachines/DC = 25**
- basicEnergyUtilization = 5
- memoryPerPM = 10
- pMmemory = 5000
- RestartDuration = 10000
- Failure Rate = 2 %

```
int numberOfVirtualMachines = RandomNumber.nextGaussian(pMmemory); / memoryPerPM;
```

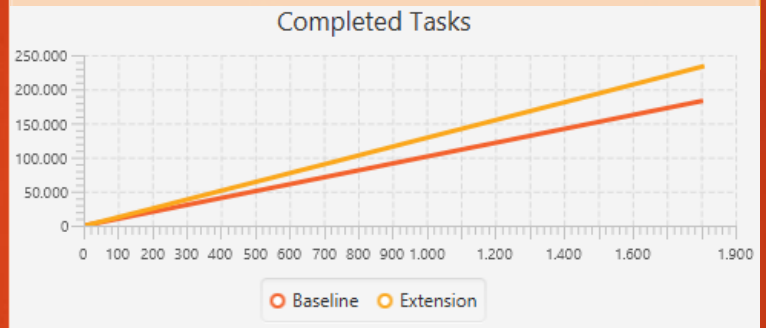
Results

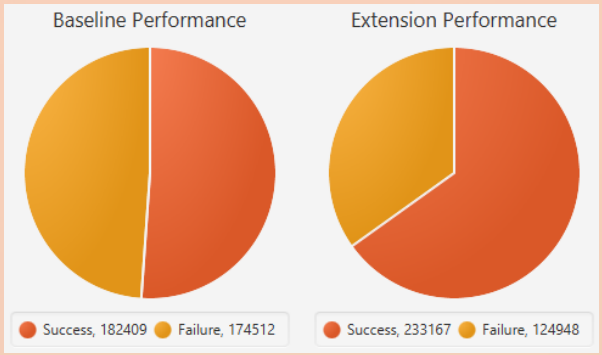
Default



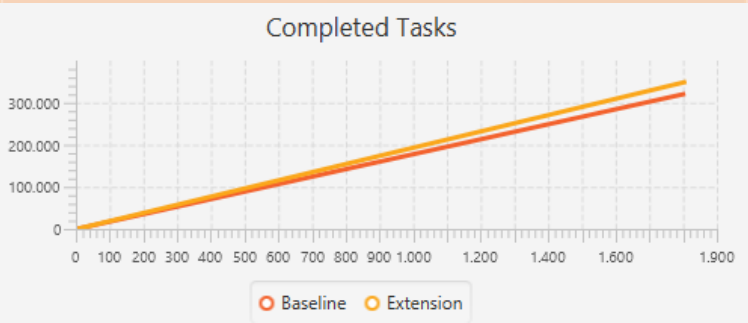


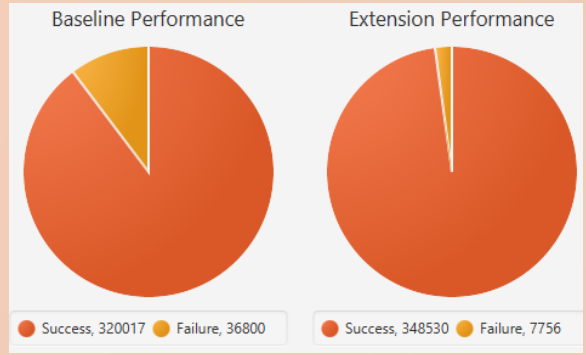
Modified Successrate





Modified Scale





Results

	Default		Modified Successrate		Modified Scale	
	Baseline	Extension	Baseline	Extension	Baseline	Extension
Success	89.65 % (637,689)	95.83 % (685,238)	51.11 % (182,409)	65.11 % (233,167)	89.69 % (320,017)	97.82 % (348,530)
Failure	10.35 % (73,646)	4.17 % (29,795)	48.89 % (174,512)	34.89 % (124,948)	10.31 % (36,800)	2.18 % (7,756)
Energy Utilization	48,111.99	51,265.53	55,608.66	77,897.07	19,075.82	18,854.14
Latency	0 ms	128 ms	0 ms	248.72 ms	0 ms	0 ms

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Results

Compare to SLAs

- Maximize Number of Completed Jobs
  - The Success-Rate of Distributed Jobs Must be Higher Than 80% ✓
- Minimize Latency
  - A Job is Always Transferred to the Next Best PM
  - The Average Latency Must be Lower Than 500 ms ✓
- Keep Energy Utilization in Suitable Area
  - Energy Consumption Must be Lower Than 80.000 ✓

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