VmigSim: Simulation study of time-limited VM migration scheduling in WANs

Why does a migration?

o More and More VMs.

o Migration keeps services running.

Image credit: http://background-kid.com/data-center-wallpaper.html

Why must a migration be efficient?

o Datacenters are mostly connected by WAN.

o WAN is usually unstable.

o Time limitation involved.

Image credit: http://www.slideshare.net/insideHPC/update-on-hpc-use-on-aws
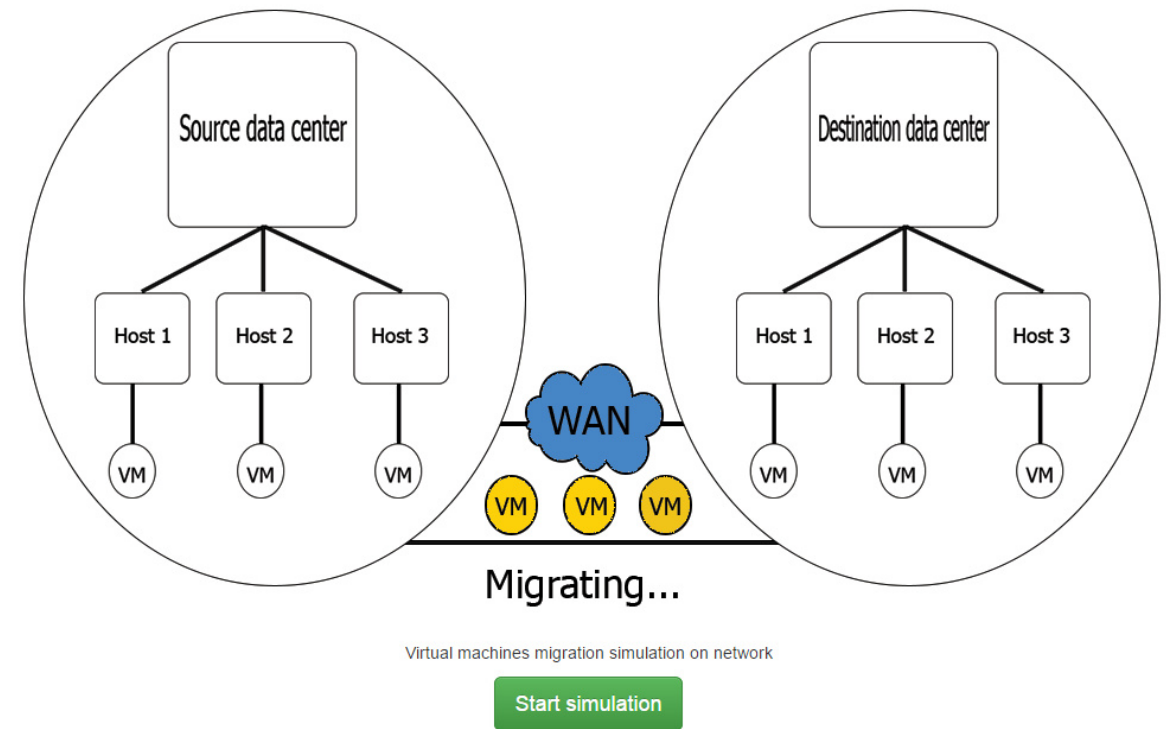
What do we exactly do?

o Study factors affecting the VM migration time.

o Study various migration mechanisms and scheduling policies.

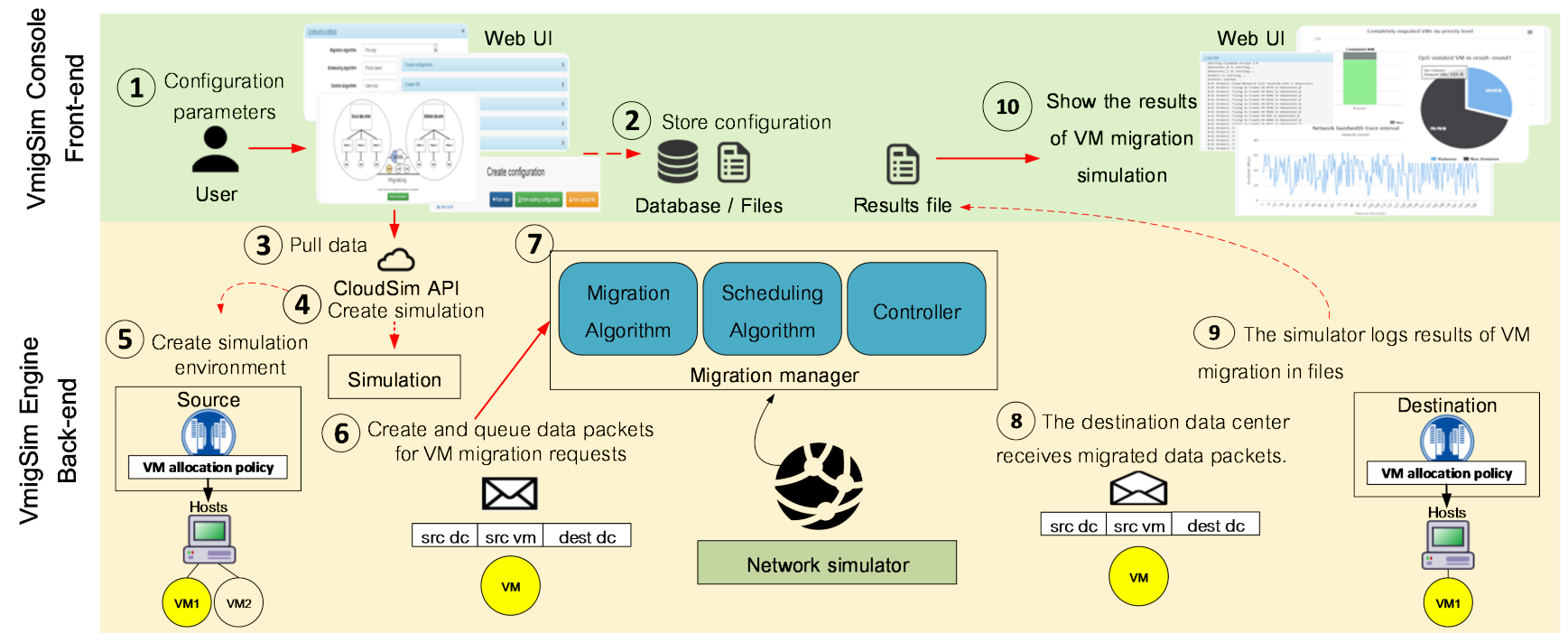o Design and develop efficient migration management mechanism.

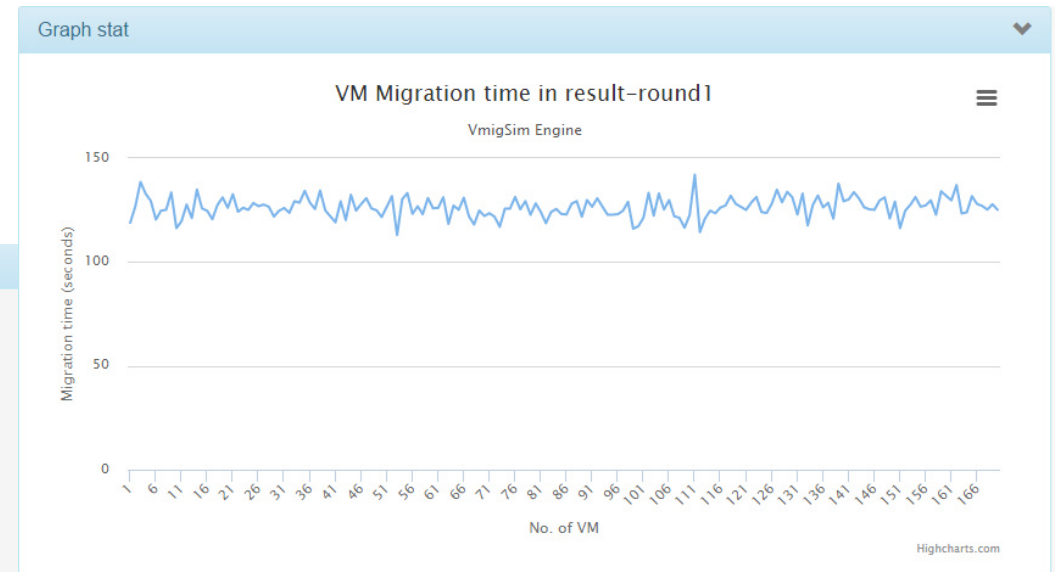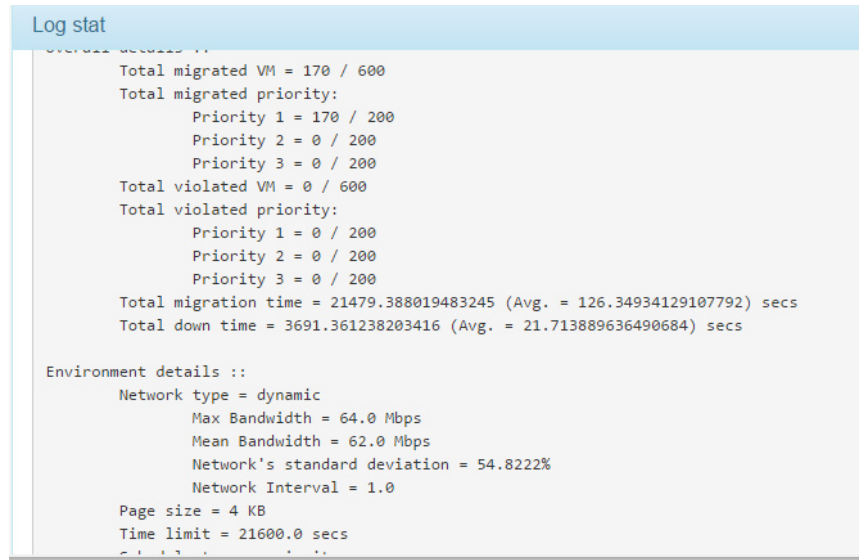# VmigSim

o Cross-datacenter VM migration Simulation.

Virtual machines migration simulation on network

VmigSim

o Extends CloudSim.

VmigSim

○ Web-based graphical interface.

Graph stat

VM Migration time in result–round1
VmigSim Engine

Graph result

Log stat

```
Overall details ::
        Total migrated VM = 170 / 600
        Total migrated priority:
                Priority 1 = 170 / 200
                Priority 2 = 0 / 200
                Priority 3 = 0 / 200
        Total violated VM = 0 / 600
        Total violated priority:
                Priority 1 = 0 / 200
                Priority 2 = 0 / 200
                Priority 3 = 0 / 200
        Total migration time = 21479.388019483245 (Avg. = 126.34934129107792) secs
        Total down time = 3691.361238203416 (Avg. = 21.713889636490684) secs

Environment details ::
        Network type = dynamic
                Max Bandwidth = 64.0 Mbps
                Mean Bandwidth = 62.0 Mbps
                Network's standard deviation = 54.8222%
                Network Interval = 1.0
        Page size = 4 KB
        Time limit = 21600.0 secs
```

Text result

Our conclusions

1. VmigSim considers the dynamic bandwidth, while CloudSim does not.

Migration time comparison
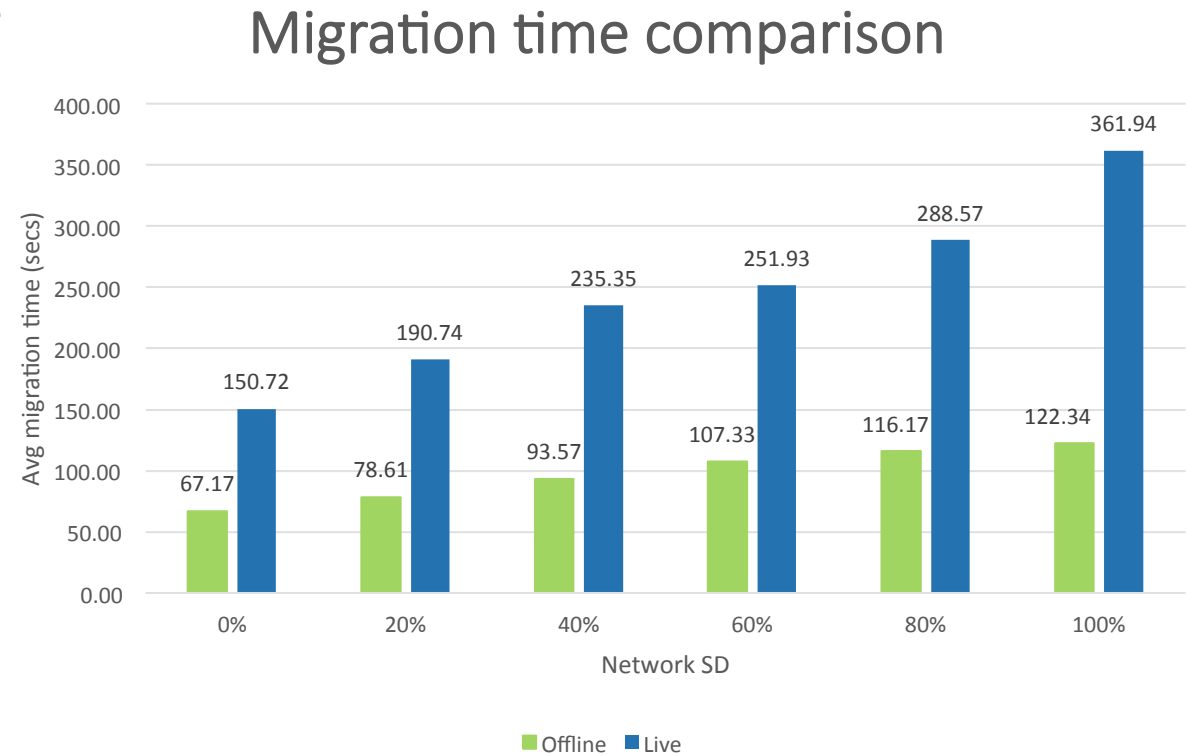
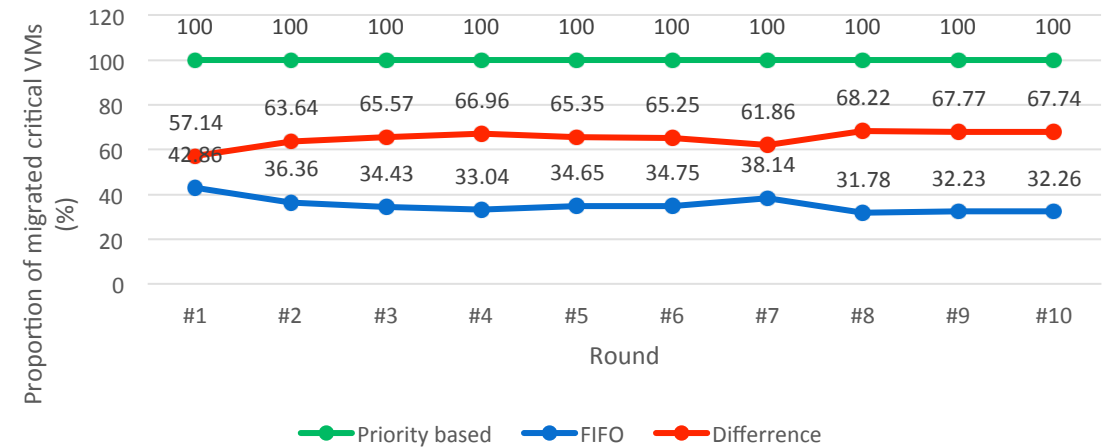# Our conclusions

2. The priority-based scheduling improves the number of critical VMs successfully migrated.

Migrated critical VM comparison
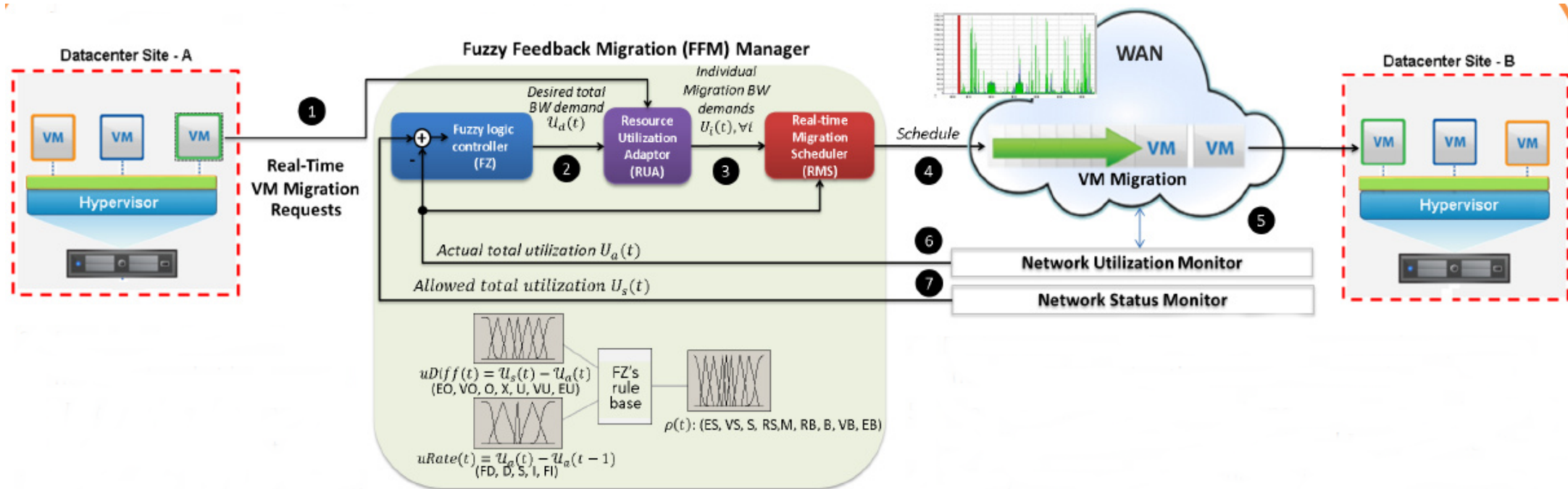

Migrated critical VMs proportion	Average (%)	Stddev
Priority, Pre-copy	100.00	0.00
FIFO, Pre-copy	35.05	3.39
Higher	64.95	3.39

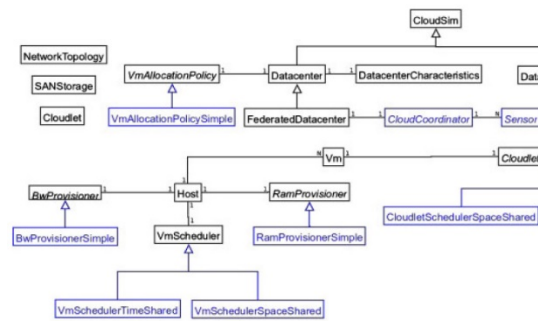# Ongoing & future work

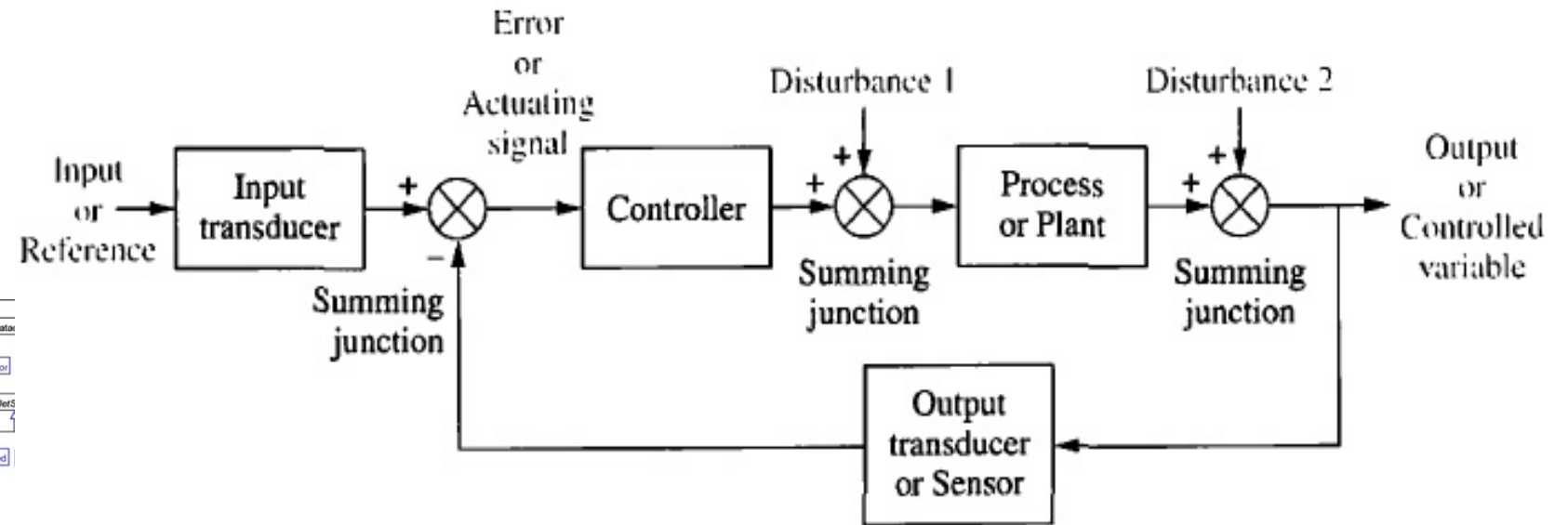o Close-loop looks promising.

Thank you

Image credit: Nise, N.S., Control Systems Engineering. 2011: p. 2-30.

CloudSim's structure