Scalable Elastic Systems Architecture (SESA)

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An Organizing Architecture and Research Agendas
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What does Scalable and Elastic Hardware look like?
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What is the right Service Interface for exposing fine grain elasticity?

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Can we rethink system software in light of massive Scale and Elasticity?

What is the right Service Interface for exposing fine grain elasticity?

What does Scalable and Elastic Hardware look like?
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What kind of Apps can we enable?

Can we rethink system software in light of massive Scale and Elasticity?

What is the right Service Interface for exposing fine grain elasticity?

What does Scalable and Elastic Hardware look like?
SESA Utility on HaaS

Constructing a dynamic distributed pool on Demand VMs

Scalable Elastic Pool of VMs

Functional Network

Control Network

MOC provided HaaS Head Node

To MOC HaaS Master

ADD HaaS Node

$ khAdd
SESA Utility on HaaS
Constructing a dynamic distributed pool on Demand VMs
Scalable Elastic Pool of

Functional Network

Control Network

MOC provided HaaS Head Node

To MOC HaaS Master

ADD HaaS Node

$ khAdd

$
SESA Utility on HaaS

Constructing a dynamic distributed pool on Demand VMs

Scalable Elastic Pool of VMs

Functional Network

Control Network

$ khRemove node2

MOC provided HaaS Head Node

To MOC HaaS Master
SESA Utility on HaaS
Primitives for using the Pool: Virtual Networks

Creating a Virtual Network:

$ kh allocNet

Control Network

Functional Network

Scalable Elastic Pool of VMs

net1
SESA Utility on HaaS

Primitives for using the Pool: Virtual Networks

$ kh allocNet

Create VM Network

Scalable Elastic Pool of

Functional Network

Control Network

net1

net2
SESA Utility on HaaS

Primitives for using the Pool: Virtual Machines

Allocate VM

net1

net2

Scalable Elastic Pool of

Functional Network

$ kh alloc net1 myLinux myinitrd 1

Control Network
SESA Utility on HaaS

Primitives for using the Pool: Virtual Machines

Scalable Elastic Pool of

Functional Network

Control Network

net1

net2

Allocate VM
SESA Utility on HaaS

Primitives for using the Pool: Virtual Machines

Allocate VM

Scalable Elastic Pool of VMs

Functional Network

$ kh alloc net2 myLinux myinitrd 1

Control Network
SESA Utility on HaaS

Primitives for using the Pool: Virtual Machines

Allocate VM

Scalable Elastic Pool of

Functional Network

$ kh alloc net1 myLinux myinitrd 23
A SESA App on top
Scalable Elastic Fetal MRI Processing

http://ElasticRecon.org

Dragging and Drop files onto MOC Hosted Elastic Reconstruction Node...
Scalable Elastic Fetal MRI Processing

Step 2: View Progress of Computation — very expensive — takes Hours — But Doctors need results in minutes.
Scalable Elastic Fetal MRI Processing

Step 3: Redirect to Viewer with Results
SESA MOC Haas Utility

Scalable Elastic Pool of VMs

Control Network

Functional Network

$ node ElasticRecon &
Scalable Elastic Pool of VMs

Functional Network

Control Network
Scalable Elastic Pool of VMs

Functional Network

NodeJS
WebApp

request
SESA MOC Haas Utility

Scalable Elastic Pool of VMs

Functional Network

Control Network

EbbRT Hosted FetalRecon

NodeJS WebApp
SESA MOC HaaS

Utility

Scalable Elastic Pool of VMs

Functional Network

Control Network

FetalRecon

NodeJS WebApp

EbbRT Hosted
Scalable Elastic Pool of VMs

Control Network

Functional Network

NodeJS WebApp

results
Status

- WebApp Working with Original Reconstruction App working on a MOC HaaS node
- Initial implementation of an Elastic VM utility infrastructure on top of MOC HaaS
- New EbbRT based App works for a small sliver of the application dynamically Allocating and Freeing VM’s as needed
- Still a ways to go to meet speed up and elasticity goals however earlier exemplar on BG indicates it is do-able