

The Siamese Twins of IT Infrastructure: Grid and Virtualization

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Agenda

- Discuss virtualization
- Contrast Grids approach to virtualization and “virtualization” approach to virtualization
- Discuss impact to OGF
- Call to action

Chinese Proverb

*“Give a man a fish and you feed him for a day;
Teach him how to fish and you feed him for a
lifetime”*

Or do you subscribe to the American version

*“Give a man a fish and you feed him for a day; Teach him how
to fish and he will sit in the boat and drink beer all day”*

**Presentation will focus on concepts rather
than products!!**

What is virtualization?

Some definitions:



Virtualization is the creation of a [virtual](#) (rather than actual) version of something, such as an [operating system](#), a [server](#), a storage device or network resources

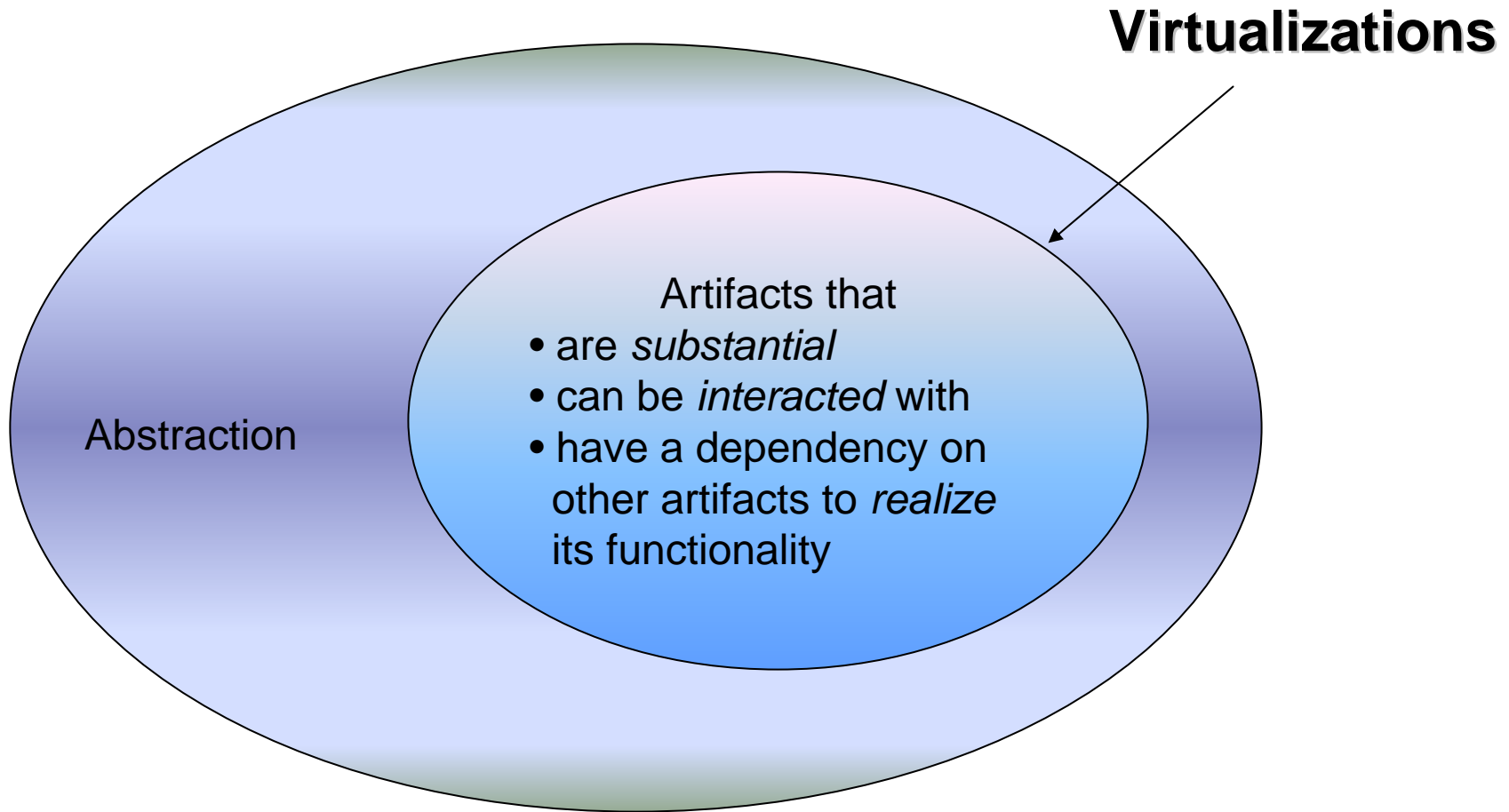


The deployment of a virtual technique

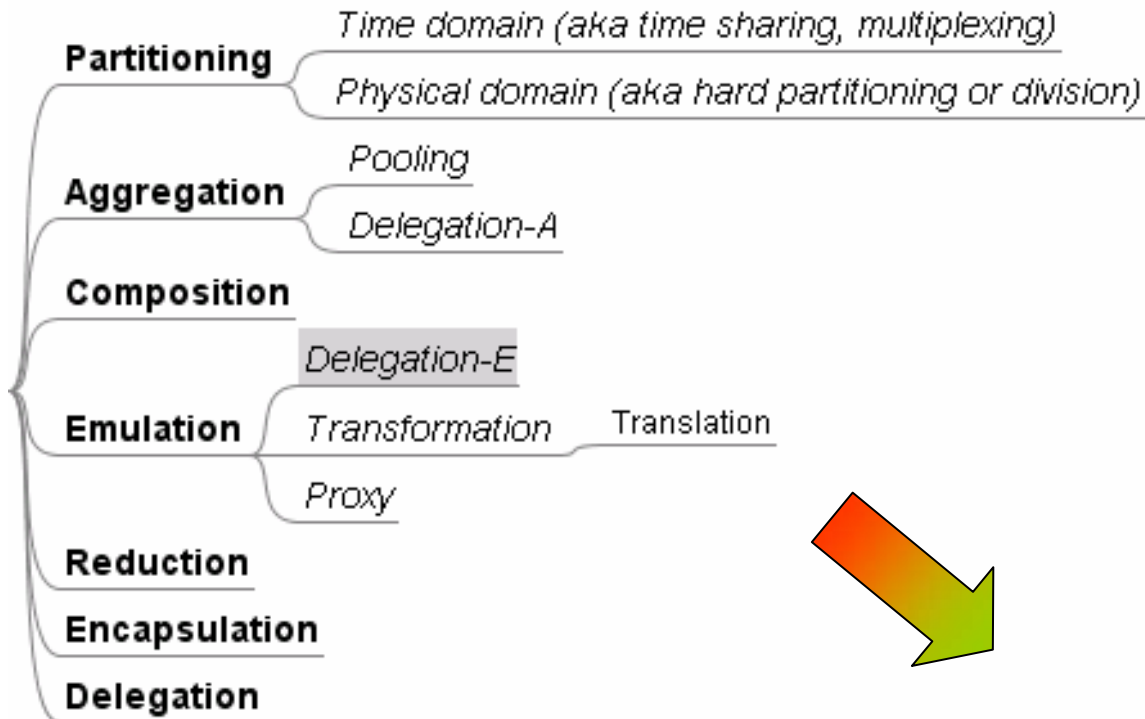


Virtualization is a technique for hiding the physical characteristics of computing resources to simplify the way in which other systems, applications, or end users interact with those resources

What are the important elements of virtualizations?



How do I create virtualizations?



- **Machine virtualization** (Partitioning, Composition, Encapsulation)
 - **Application virtualization** (Reduction, Partitioning, Aggregation)
 - **Storage virtualization** (Partitioning, Aggregation)
 - **Interface virtualization** (Reduction) and **Function virtualization** (Encapsulation)
- SOA** {

Results of virtualization



- De-coupling
- Separation
- Isolation/Insulation
- Simplification
- Encapsulation
- Re-use

**Simplicity at
component level**

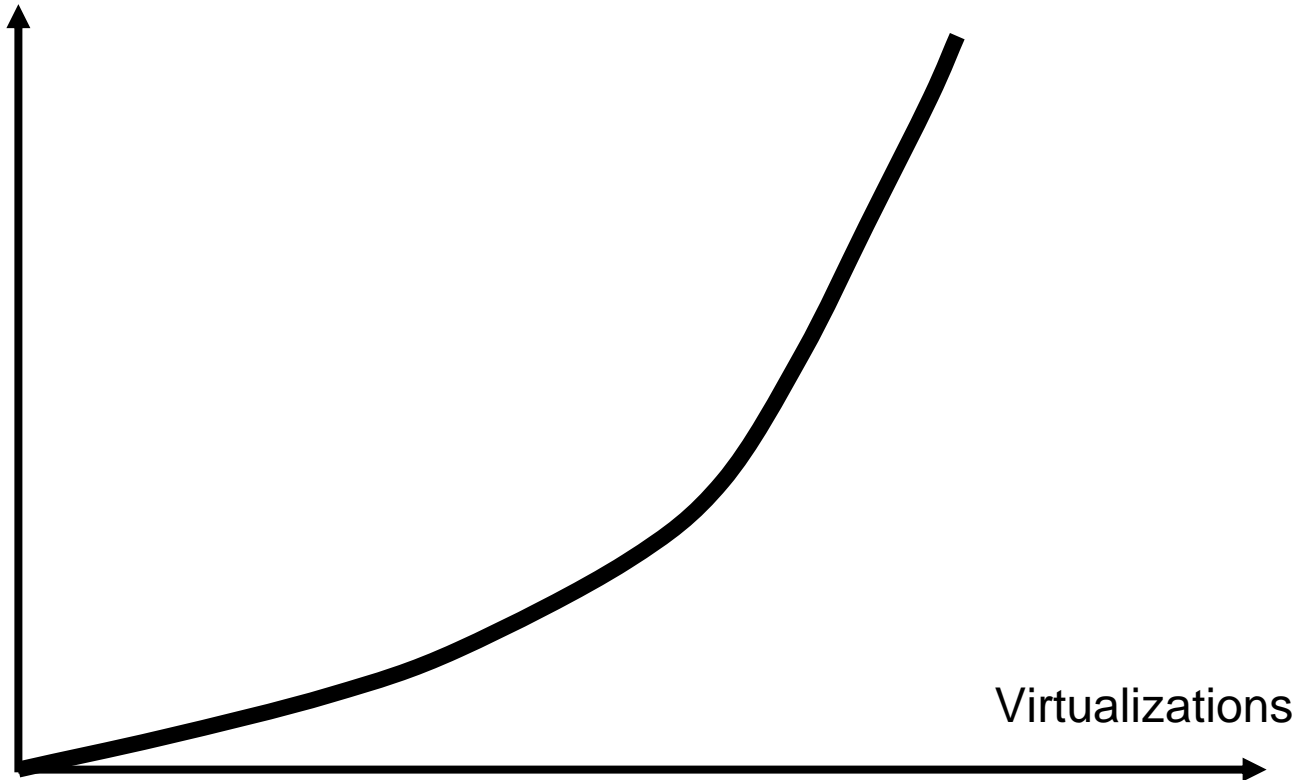


- Increased Associations
- Requires explicit bindings
- Instance and association management
- Performance
- Contextualization

**Complexity at
system level**

Virtualization -> Complexity at large scale

Complexity
(in
Associations,
Management
etc)

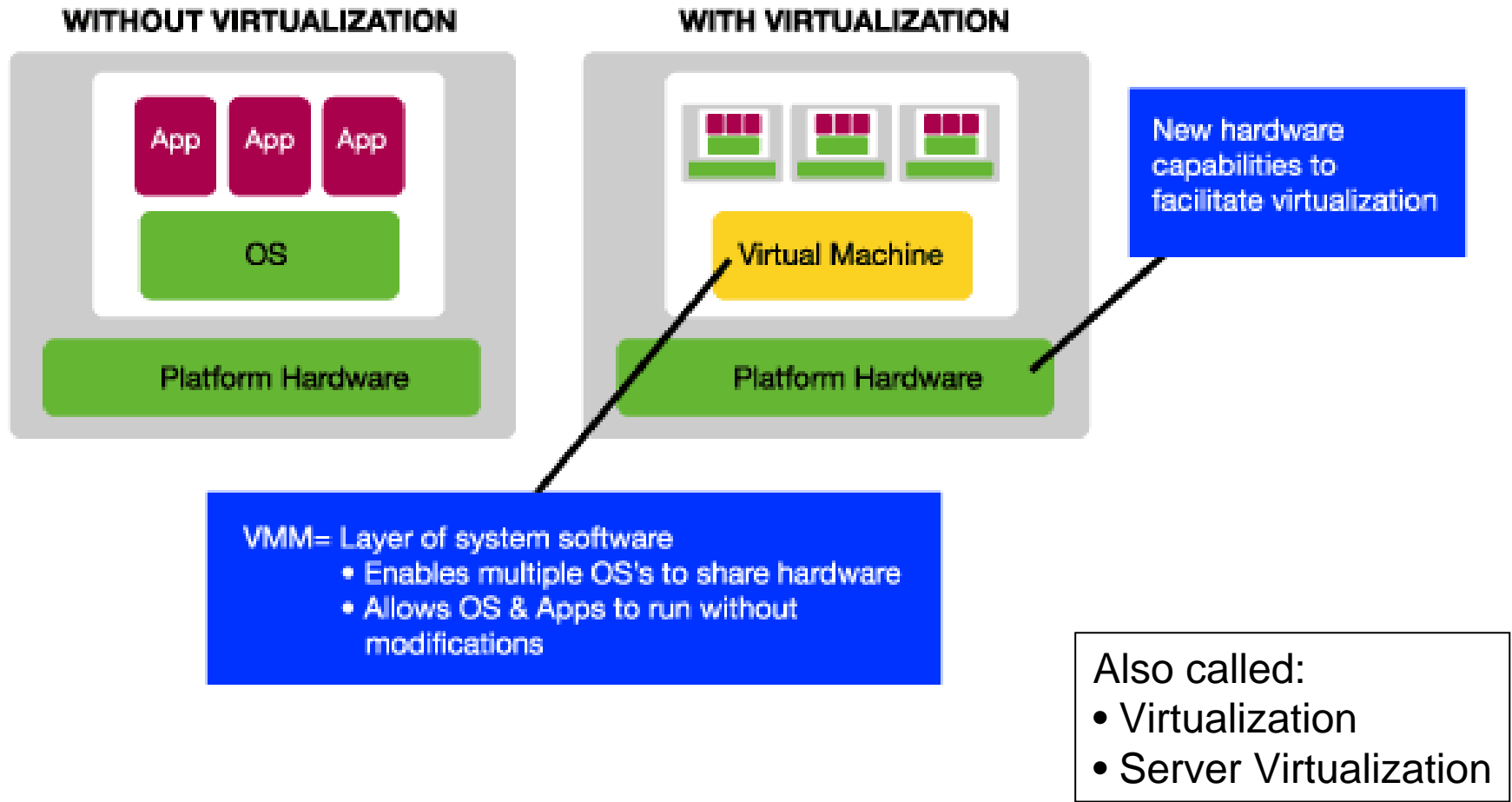


*Disclaimer: A "doodle" for
Illustration only*

“Virtualization” and Grids

Using virtualization as found in industry parlance today

What is (Machine) Virtualization?



- Ok ... cool I got a virtual machine and a virtualized machine
- So what use is it:
 - I can run workloads in it
 - I can encapsulate an environment in it
 - I can configure, provision and lifecycle manage it....
 - Etc ...
- So what did you say one does in a Grid?

Grids are systems-level virtualizations but also are infrastructures for managing workload and infrastructure virtualizations

Whether broad or narrow, Grids are about scaling IT

Build *at scale*



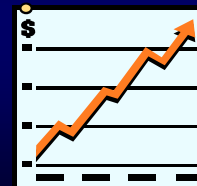
Operate *at scale*



Manage *at scale*



Change *at scale*



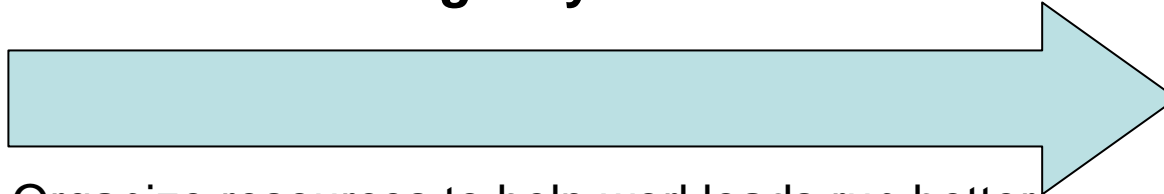
Source: Mark Linesch

Two sides of the same coin?

Grids

“How do I *run/manage* my *workloads* better?”

Workloads



Resources

Organize resources to help workloads run better

Machine Virtualization

“How do I *use/manage* my *resources* better?”

Workloads



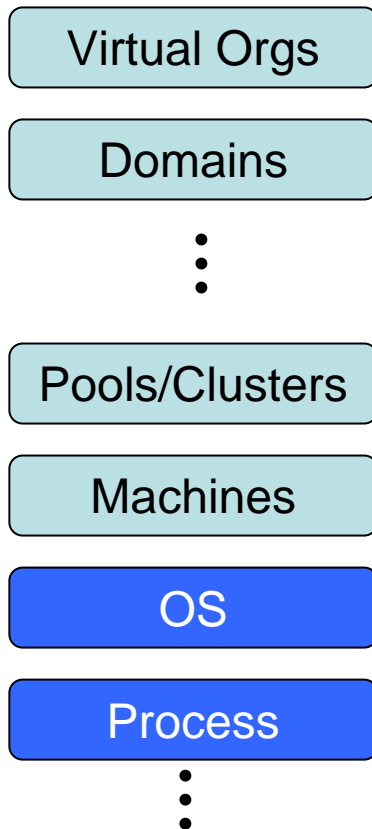
Resources

Manipulate workloads to help use resources better

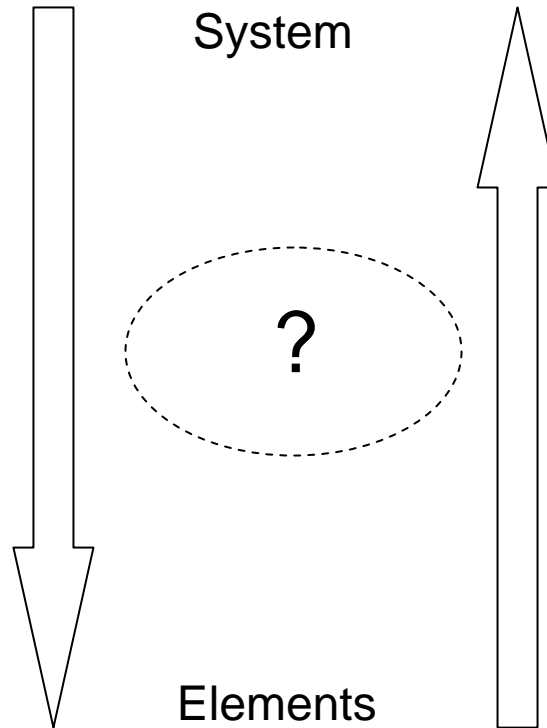
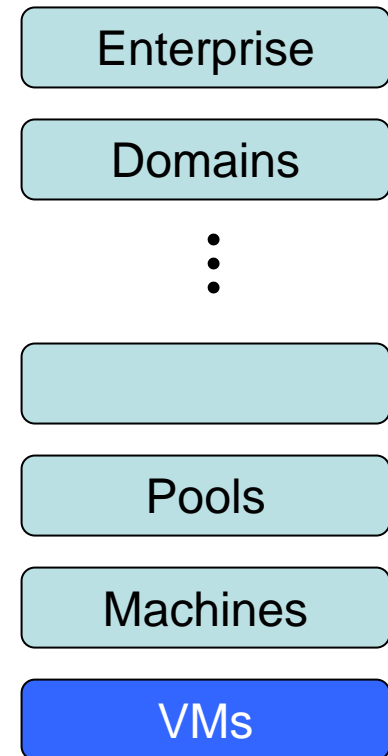
Different starting points but the middleware is very similar (same?) – **need to converge at the middleware**

Scope inversions?

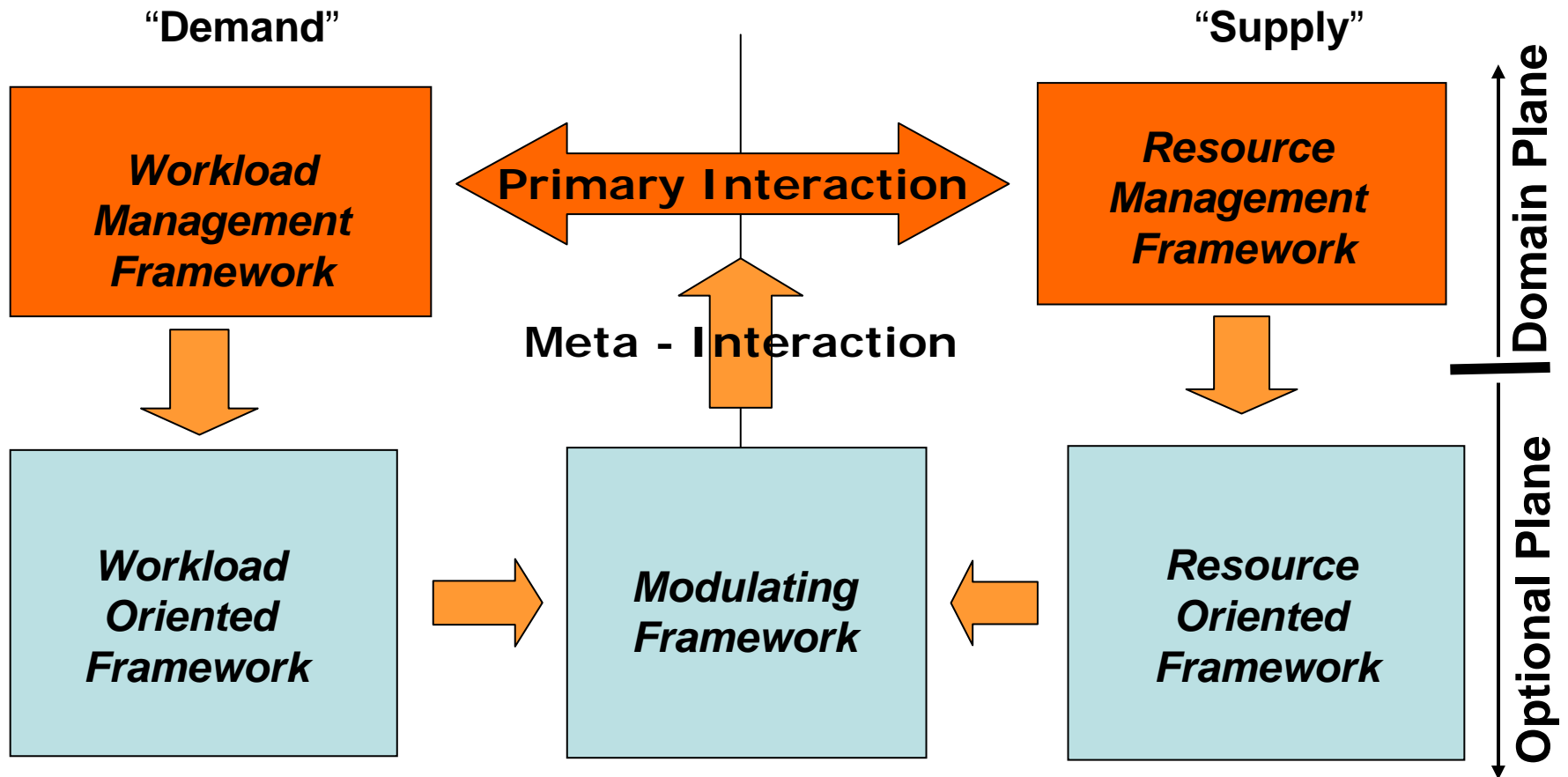
Grids



Machine Virtualization



Unifying Paradigm?

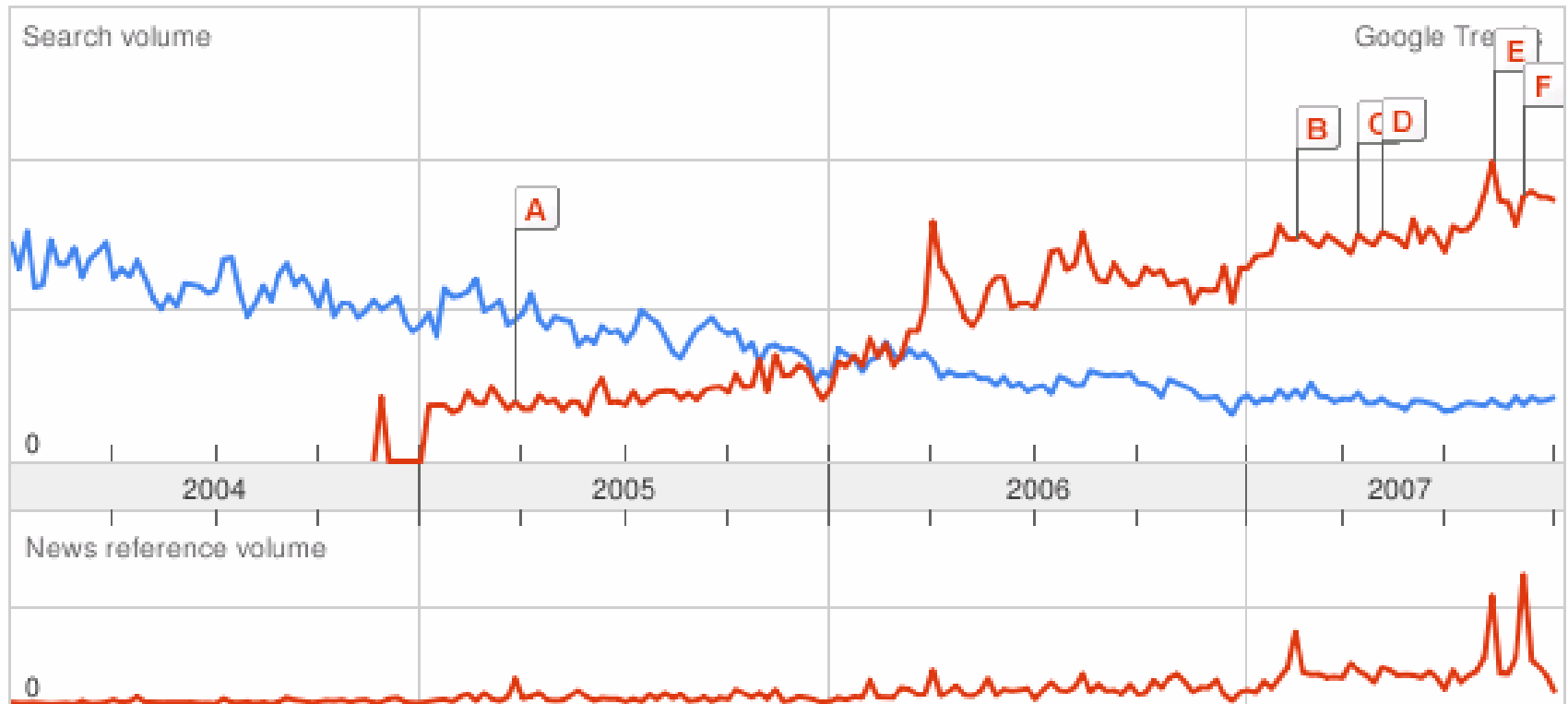


- Demand-Supply model is *not* another way of describing a request/response
- Describes the dynamic nature of complex systems – system equilibrium – involves selective cooperation and competition

OGF and “Virtualization”

What's wrong here ...

● "grid computing" ● "virtualization"



An example: BES

- Defines “operations” on a “container” that contains (“runs”) “activities”.
- “A **BES** implementation executes each activity that it accepts on an appropriate **computational resource**, which—depending on the **BES** implementation and the type(s) of activities supported—may be a single computer, a cluster managed through a resource manager such as Load Leveler, Sun **Grid** Engine, Portable Batch System, or Condo, a Web Service hosting environment, or even another **BES** implementation”
- Operations on container:
 - CreateActivity
 - Terminate Activity
 - GetActivityStatus
 - GetActivityDocuments
 - GetAttributesDocument

OGF and “mainstream” virtualization

- If Virtual Machines are containers then BES defines operations that such VMs need to export to support lifecycle of activities in them
- If VM (as in a virtual appliance), the BES defines operations on the VA

But BES has no reference to virtual machines/virtualization in the docs (even when listing examples)

Why The discussion is narrowly focused on HPC cluster computing. Thinking more “mainstream” will show how OGF is very relevant to the new “virtualization” hype

And ... there are other examples

To summarize

- Grids and “virtualization’ are distinct but joined in the middle – Siamese twins
- Grids (and OGF) are key to realization the full potential of virtualization and vice versa
- OGF (and its Grids view) has to move mainstream if we are to be relevant in the “virtualization” euphoria

Thank you !!