

## Virtual Grid Finder and Binder (vgFAB)

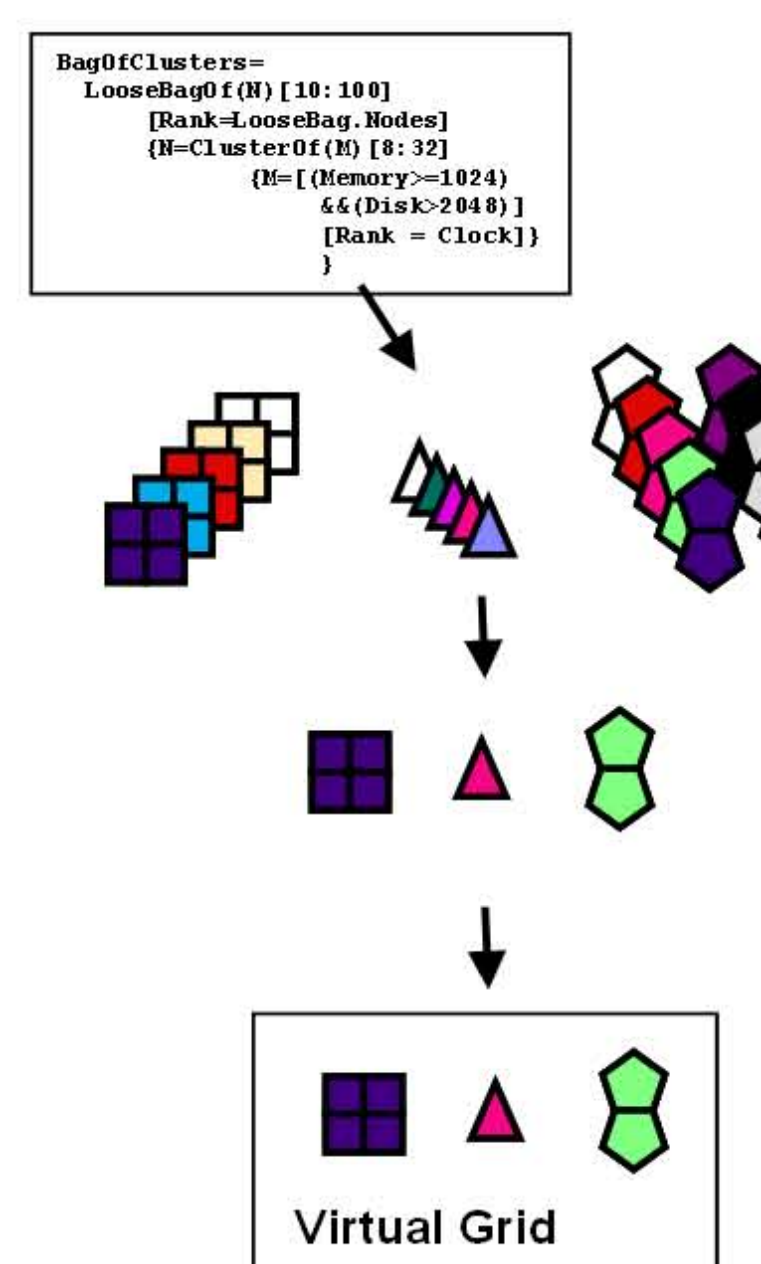
*Yang-Suk Kee*

### Goal:

- ❖ Scalability
- ❖ Quality
- ❖ Robustness

### Technique:

- ❖ Resource Classification
- ❖ Combined Resource Selection and Binding
- ❖ Subcomponent Binding



1. Use vgDL (and rank) to enumerate a number of candidates for each component of the request
2. Iteratively attempt to bind candidates for each part based on vgDL ranking
3. Take the bound resource for each component, and combine them into a VG

## Virtual Grids

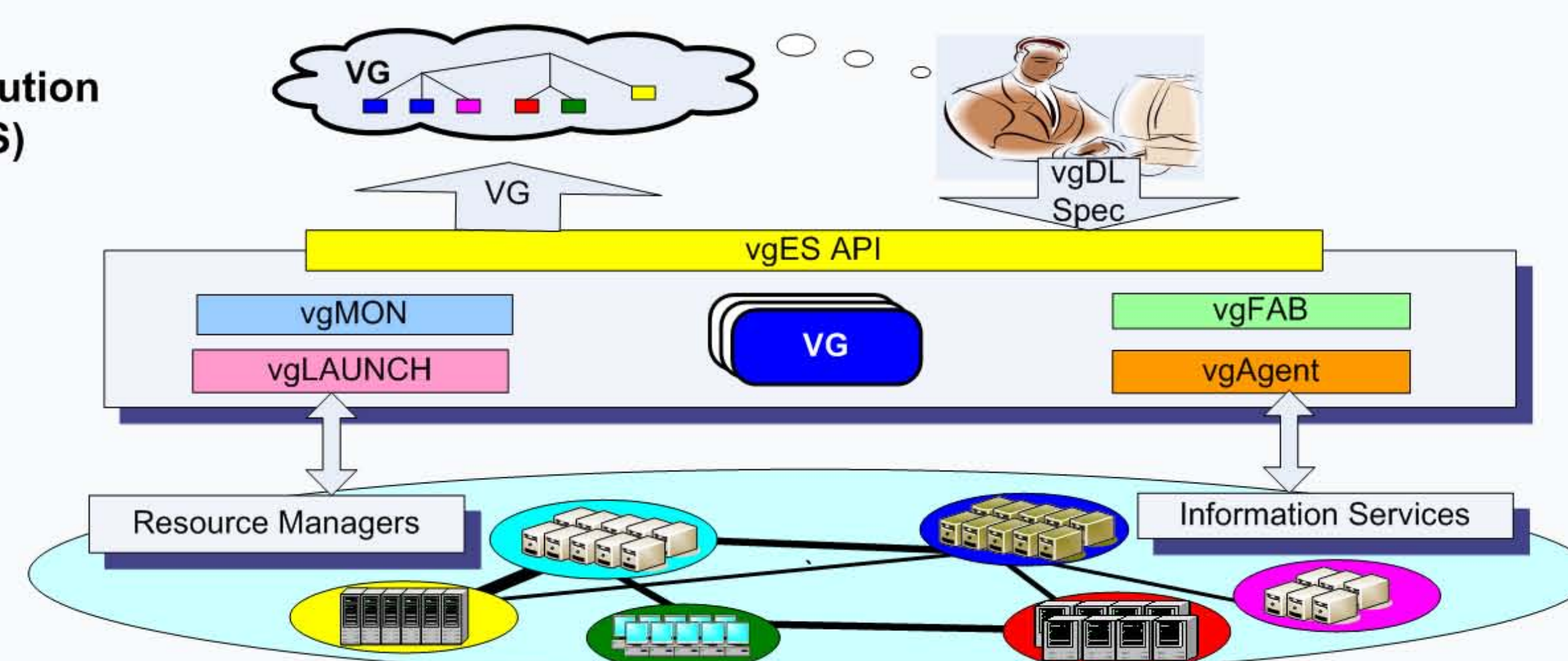
### Challenge

- ❖ Separation of Concerns
  - Application Planning and Management
  - Complex Grid Resource Environment Mgmt
- ❖ Scalable Selection and Binding
  - Large Resource Pools
  - Competitive, Dynamic Environments
- ❖ Application-Driven Resource Mgmt
  - Abstraction Level
  - Grid Information
  - Support Fault-Tolerance and Reasoning about Behavior

### Approach

- ❖ Separation of Concerns
  - "Application Level" Resource Abstraction
  - vgDL: Virtual Grid Description Language
  - Virtual Grid
- ❖ Scalable Selection and Binding
  - Integrated "Finding and Binding"
  - Over selection and Dynamic Composition
- ❖ Application-Driven Resource Mgmt
  - Explicit Applications Resource Abstraction
  - Unified Resource Info. Provider
  - Launch and Monitor Computations
  - Modify to Manage Applications Resources

### Virtual Grid Execution System (vgES)



## Virtual Grid Description Language (vgDL)

- ❖ Capture real grid app. performance expression
- ❖ Hides resource complexity
- ❖ Expressive, simple, qualitative specification
- ❖ Key characteristics:
  - Resource aggregates
    - Loose Bag (Homogeneous, Tightly-Coupled)**
    - Tight Bag (Heterogeneous, Tightly-Coupled)**
    - Cluster (Heterogeneous, Loosely-Coupled)**
  - Composition of aggregators
    - Implicit: aggregators
    - Explicit: *close, far, highBW, lowBW*
  - Preferences
    - Scalar Ranking Function, Arithmetic on Attributes
  - Range-based search

## Other Components

### Virtual Grid Launcher (vgLaunch)

*Dionysios*

- ❖ An application launcher that initiates the application on the bound resources and interfaces to Globus

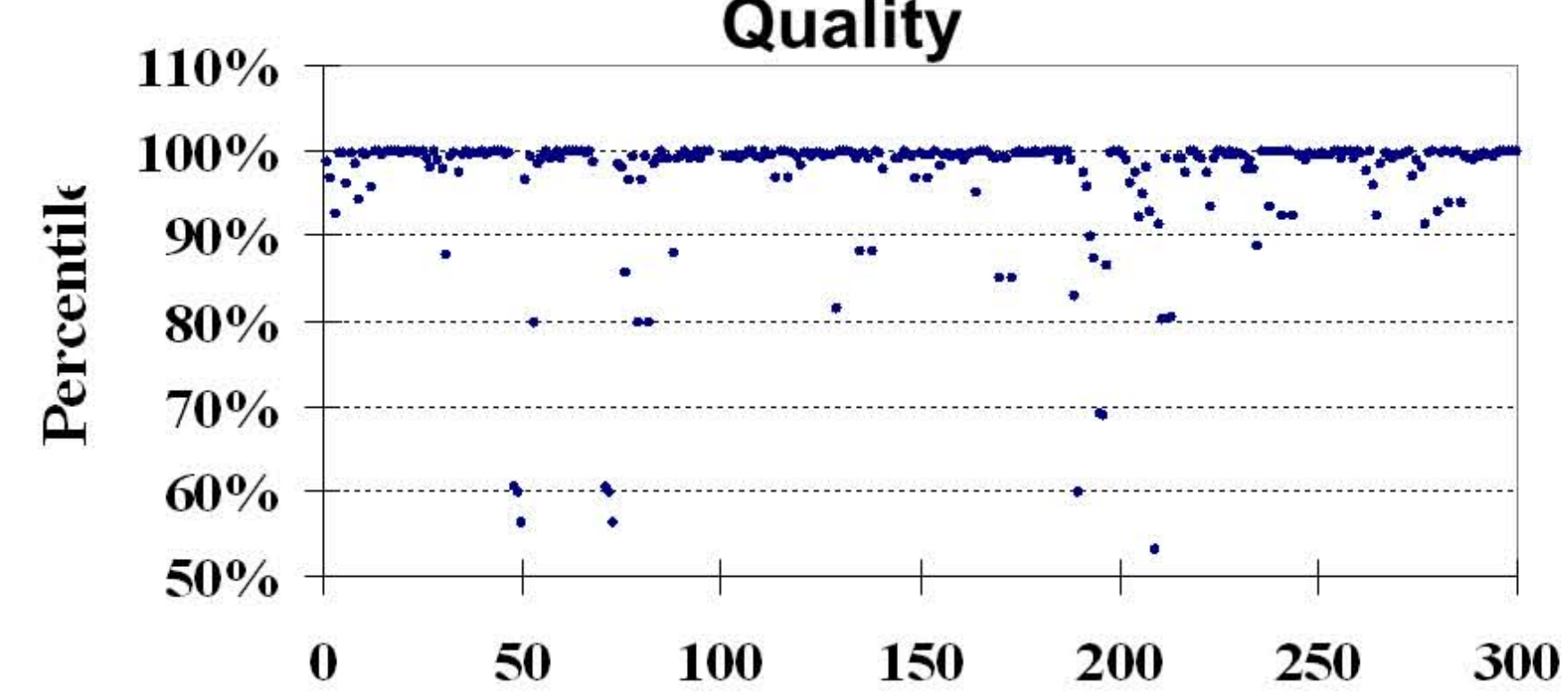
### Virtual Grid Monitor (vgMON)

*Richard & Ken*

- ❖ A distributed monitoring component that ensures resource performance expectation.

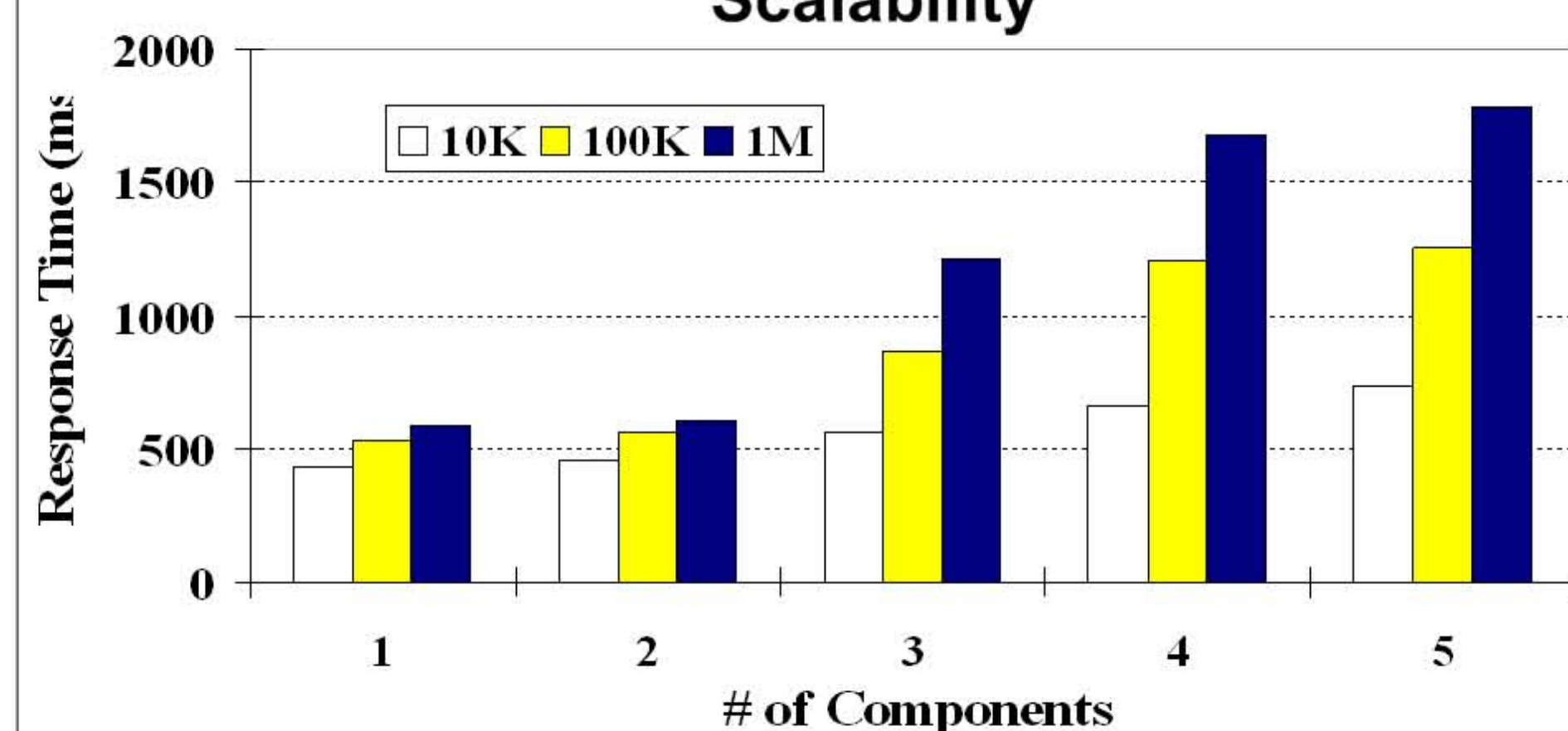
## Evaluation for vgFAB

### Quality



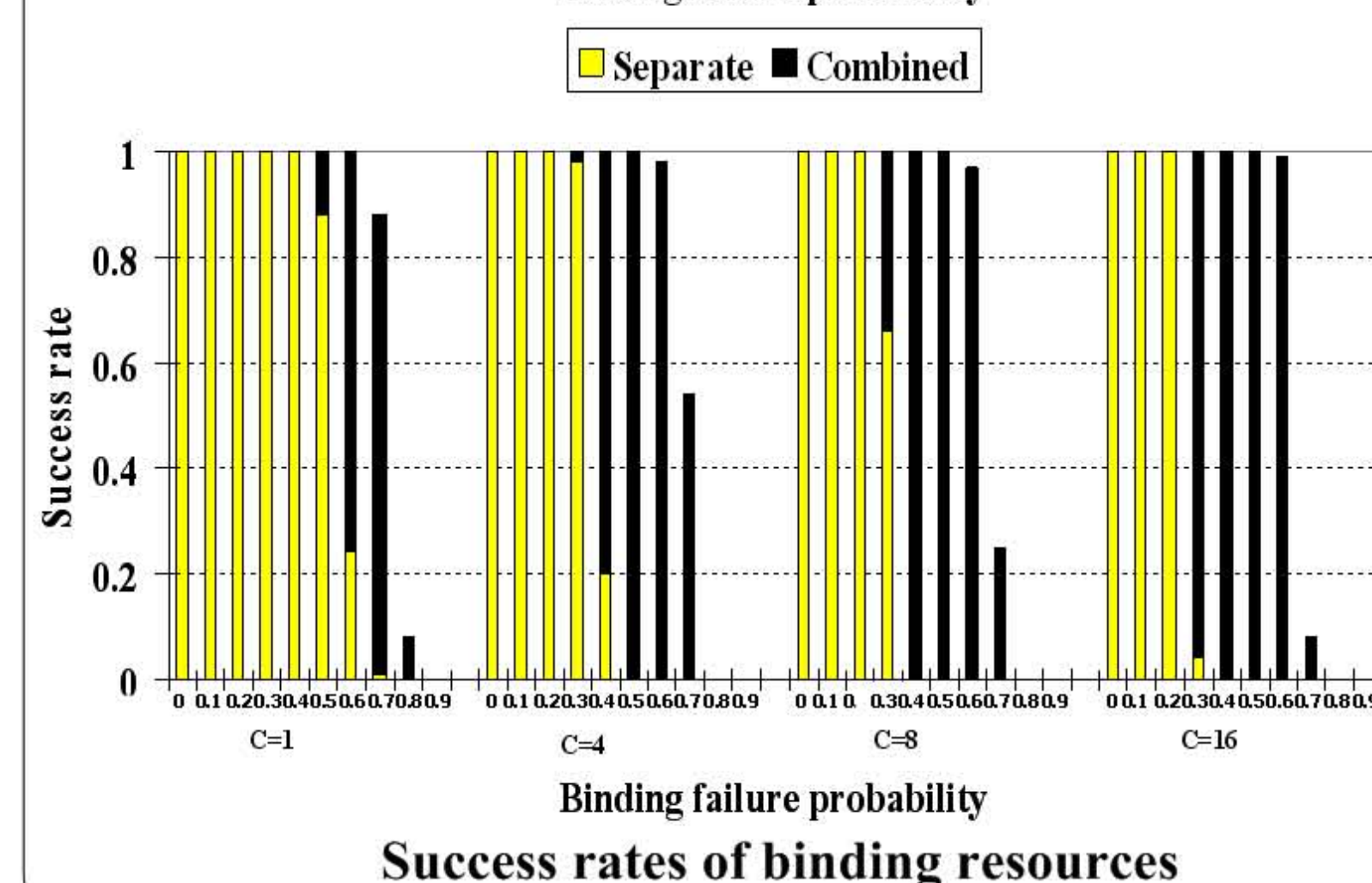
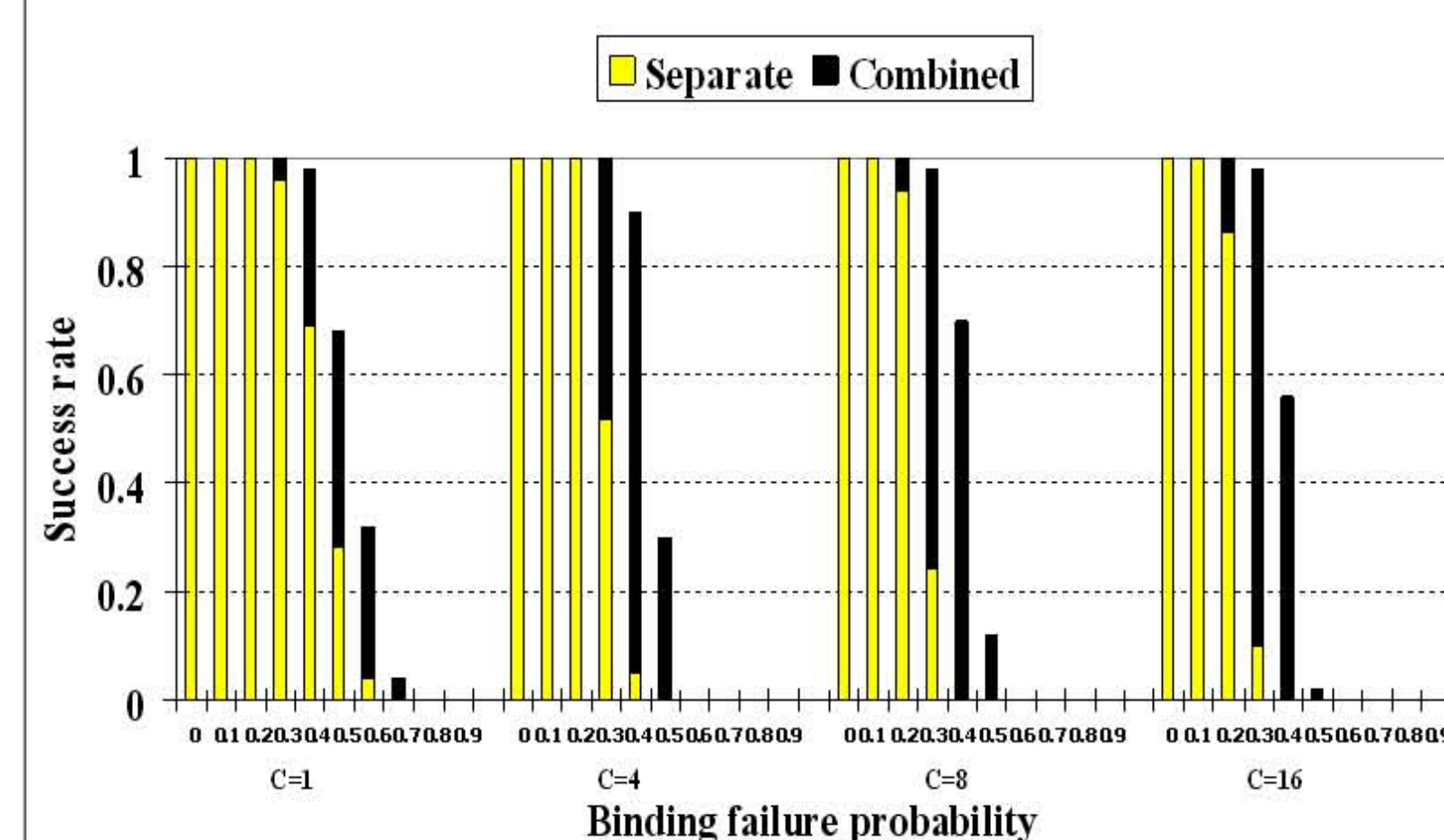
Quality of selected resources compared to the optimal one

### Scalability



Response time varying query complexity and Grid size

### Robustness



## Resource Discovery (vgAgent)

*Jerry Chou*

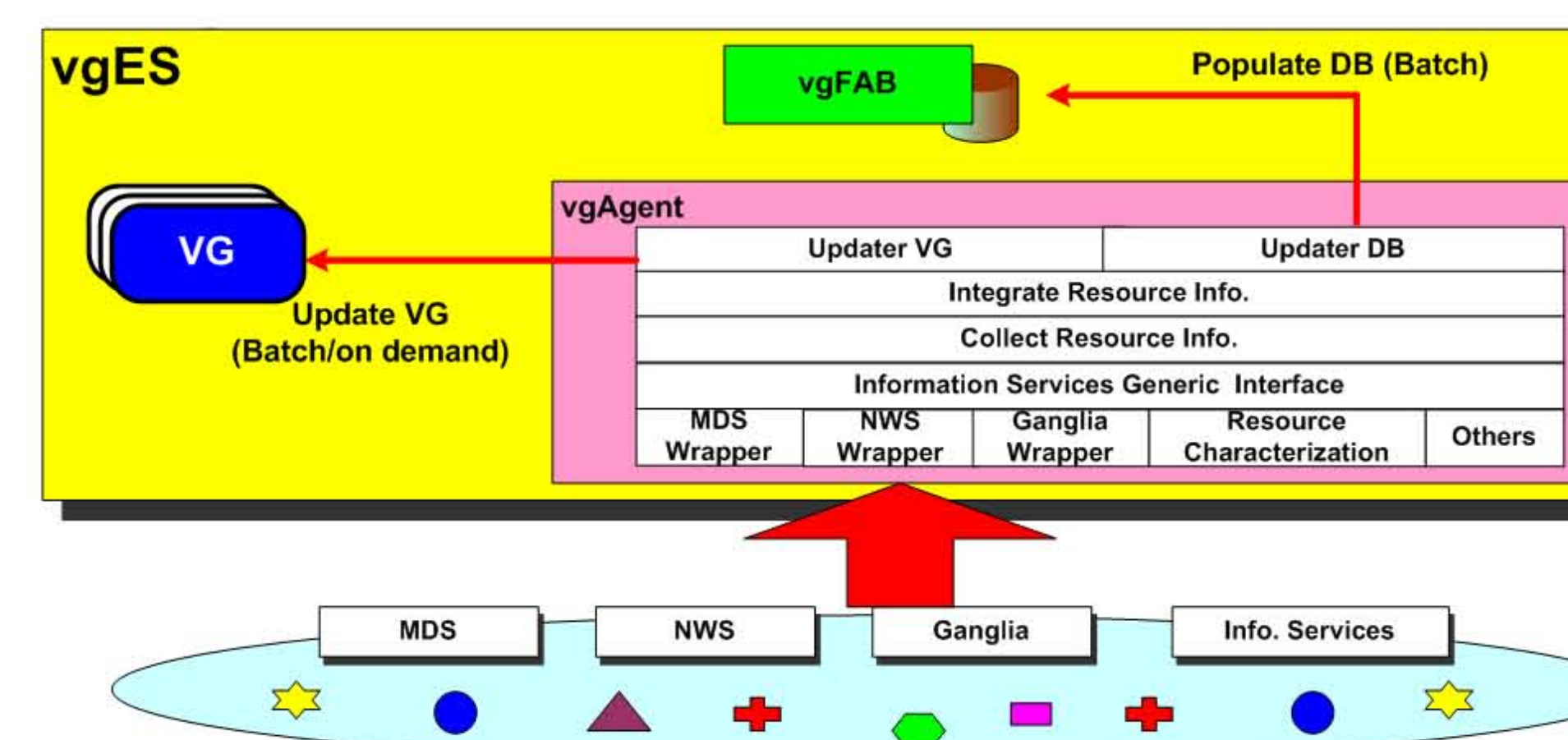
### Goal:

- ❖ Uniform Information Abstraction for Application
- ❖ Populate resource information to vgES & VG instance.
  - Periodic Update/ Batch
  - Request /On demand

### Challenge:

- ❖ Incomplete and inconsistent resource information
- ❖ Dynamic environment → resource status change rapidly
- ❖ Scalability in terms of network traffic & info. size

### Architecture



## Publication

- ❖ **The Virtual Grid Description Language: vgDL**, UCSD Technical Report CS2005-0817. And Update to The Virtual Grid Description Language: vgDL, Version 0.96, March 16, 2005.
- ❖ **Efficient Resource Description and High Quality Selection for Virtual Grids**, In Proceedings of the IEEE Conference on Cluster Computing and the Grid (CCGrid 2005).
- ❖ **Realistic Modeling and Synthesis of Resources for Computational Grids**, In Proceedings of the ACM Conference on High Performance Computing and Networking, SC2004, Pittsburgh, Pennsylvania, November 2004.
- ❖ **Combined Selection and Binding for Competitive Resource Environment**, submitted for publication.