VCL
Virtual Computing Laboratory
An Opportunity to Lead

- Technical
- Economic
- Pedagogical

- Teaching & Learning
- Research & Development
- Outreach & Engagement
Avoiding Crisis-Creating Success

- Silo’ed Investments
- Complexity
- Access
- SaaS
- Borg “like”
IT Timeline

Three Foundational IT Elements

Communications

Information

Manipulation

Information Age Timeline


Network

Web

Cloud Computing

Evolution of User Capability [Abstraction Layer]

Tipping Point

Educause 2008
Economic Climate

The Worst of Times

- Education has diverse requirements
- Learning requires a technology rich environment
- Historical responses are unworkable
- Behaviors foreshadow outcomes
- Improvement depends on analytics

Risk

Crisis

Opportunity

The Best of Times

Enrollment
Expectations
Funding

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Educause 2008
What is VCL?

VCL

• Is a management, hardware and software system that provides for automated re-configuration, reuse, multiuse and leveraging of IT resources for flexible, on-demand access.

• Is a software as a service model (SaaS) of cloud computing, where computing performed elsewhere delivers a “cloud” of services to your device.

• Is a development initiative undertaken to avert crisis; i.e., to resolve technical, economic and pedagogical barriers to effective access and use of computing technology in learning and research.
Business Case

Viability
- open source
- market growth
- service provider

Apache.Org
- development
- products

MCNC
- support

IBM

Technical

Economics

VCL

C/U_Service
- agile
- scalable
- green
- systems
- customization
- usability
- licensing
- provisioning
- attribution

NC STATE UNIVERSITY
Categories of Delivered Services

- Super Computing
- Research
- Business
- Professional
- Commodity
- Consumer/Persoanl Computing

Complexity and Unit Cost

Scale of Use

Grand challenge class problems often require true supercomputing

Complementary Services
Underlying Architecture

Nothing New—Everything Different

Virtual computing Environment (VCE)

User Experience

Service Broker 1

Physical/Virtual Provisioning Engine

Service Broker 2

Service Broker 3

VCE

VCE
Why VCL Works as a Solution

VCL is Counterintuitive

• VCL delivers the economic **benefits of infrastructure consolidation** while enabling an unprecedented level of **user control and service diversity**.

• VCL **advances aspirational goals** while **leveling the playing field** across services ranging from theoretical research and innovation, to basic commodity tools.

• VCL delivers **service specific solutions** from a single shared, leveraged architectural framework that dynamically **adapts to user demand**.
VCL in Action

1. **Mainstreams special, hard to support capabilities** — allows CS students to modify, even crash, “servers” with impunity. Intelligent Pipelining, DR and BC.

2. **Broadens access to complex and costly apps** — HPC, SAS w/ArcGIS….a threshold investment anywhere lowers the barrier to entry everywhere.

3. **Provides hassle-free repeatability** — faculty have switched from traditional solutions to VCL to bypass local support challenges.

4. **Leverages underutilized capacity across disparate uses** — shifting resources between student computing and HPC. Also virtualization.

5. **Maximizes student investment, promotes safety, accommodates lifestyle, is green** — time, place, platform independence.

6. **Empowers innovation, experimentation** — allows custom software builds, custom configurations, and runtime control (virtual ownership).

7. **Facilitates analytics-based resource management** — you can’t manage what you can’t measure. Think software, power, capacity, etc.