



## Purpose:

To study, learn and research about High Performance Computing (HPC) and Cloud Computing so as to make comparisons and contrasts, specifically focusing on security, as part of WV-SOARS program in Summer 2017.

## Question:

How does Cloud Computing and High Performance Computing differ and how are they the same in regards to security?

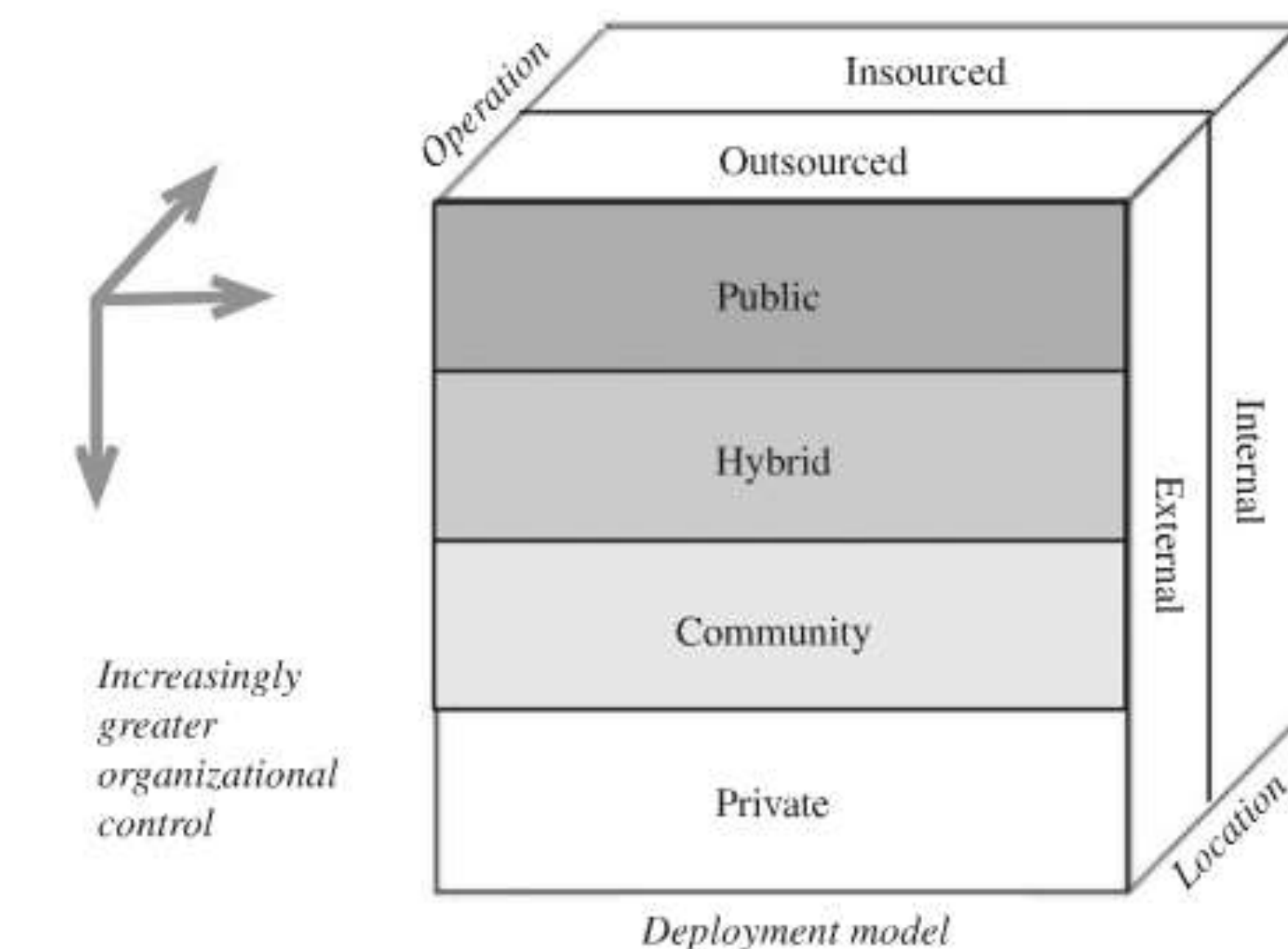
## Details:

### What is High Performance Computing?

- Pooling together many computers and their resources for large gains in performance
- Uses specialized computing hardware and software that provides this performance
- Used by businesses, educational institutions, and government to do large simulations and calculations

### What is Cloud Computing?

- Many servers connected for scalable processing power
- Allows for resources used to start small and grow with needs of your work
- Can give you access to the servers to run your own programs or can give you access to pre-built platforms to do your work



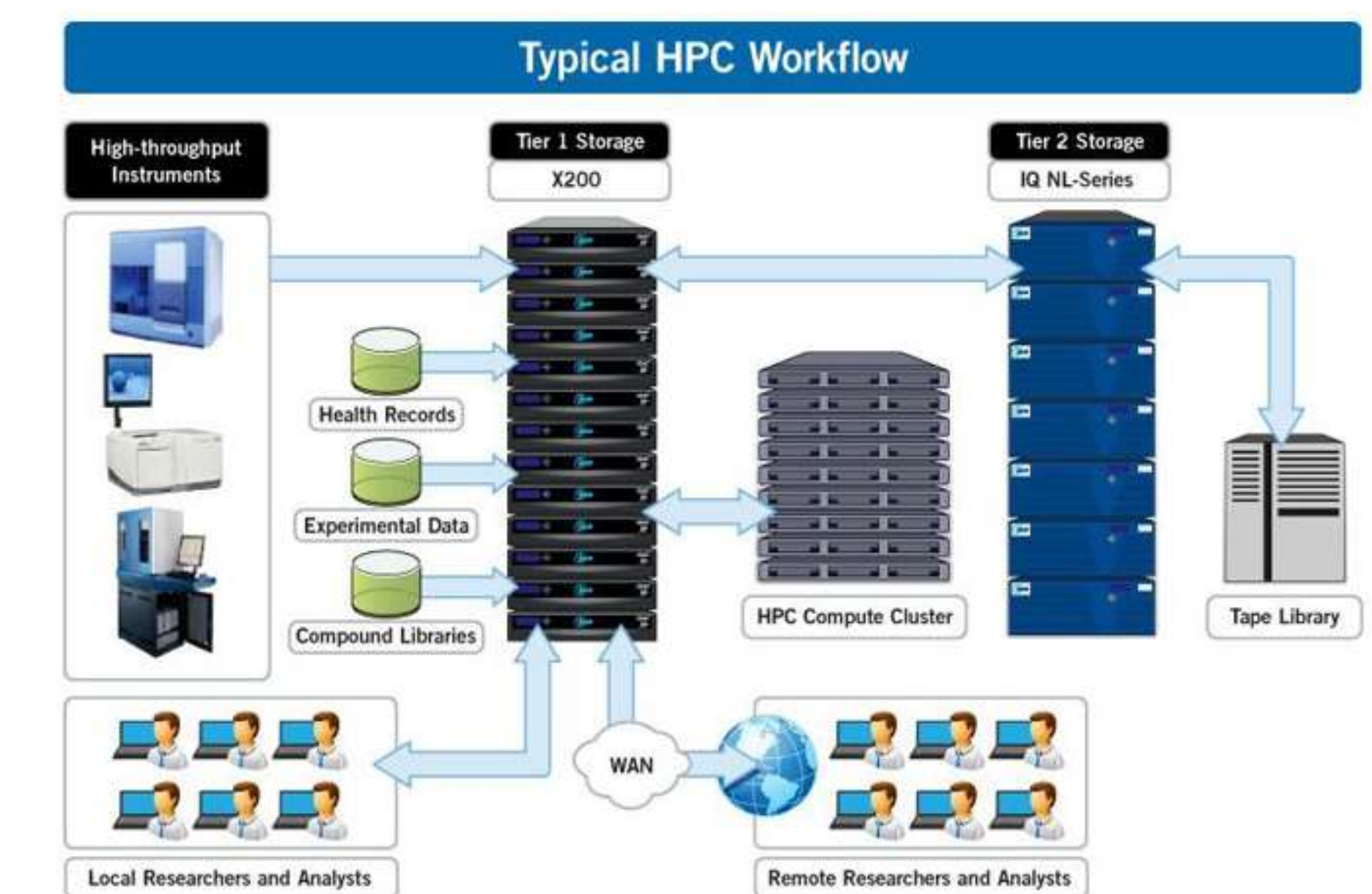
Reprinted From: *Securing the Cloud: Cloud Computer Security Techniques and Tactics*

### Why target Cloud Computing Systems or HPC?

- May store large amounts of business data that can give other businesses valuable insight
- Cloud Computing provides for large amounts of processing power that falls into a "grey" legal area, as the underlying structure is owned by other companies
- Can be used to power attacks to lock up resources on other systems

### Security Considerations

- Physical access to HPC facility must be managed
- HPC Scheduler must be protected to ensure the systems allocates proper resources and stays stable
- HPC systems are built of many computer systems, called Nodes, that must be individually secured
- Cloud Systems must ensure the hypervisor is secure, preventing unauthorized access between users of the system
- The cloud has three service models, IaaS, PaaS, and SaaS which all have different security considerations



Reprinted From: [http://uk.emc.com/R1/images/EMC\\_Image\\_C\\_1310622185558\\_isi-hpc-workflow.png](http://uk.emc.com/R1/images/EMC_Image_C_1310622185558_isi-hpc-workflow.png)

## Conclusion:

HPC Systems and Cloud Computing systems share many security considerations, however HPC systems need to be more aware of physical security while Cloud Computing systems require more attention for virtual security.