Cloud Computing Elements

Rob Nickerson

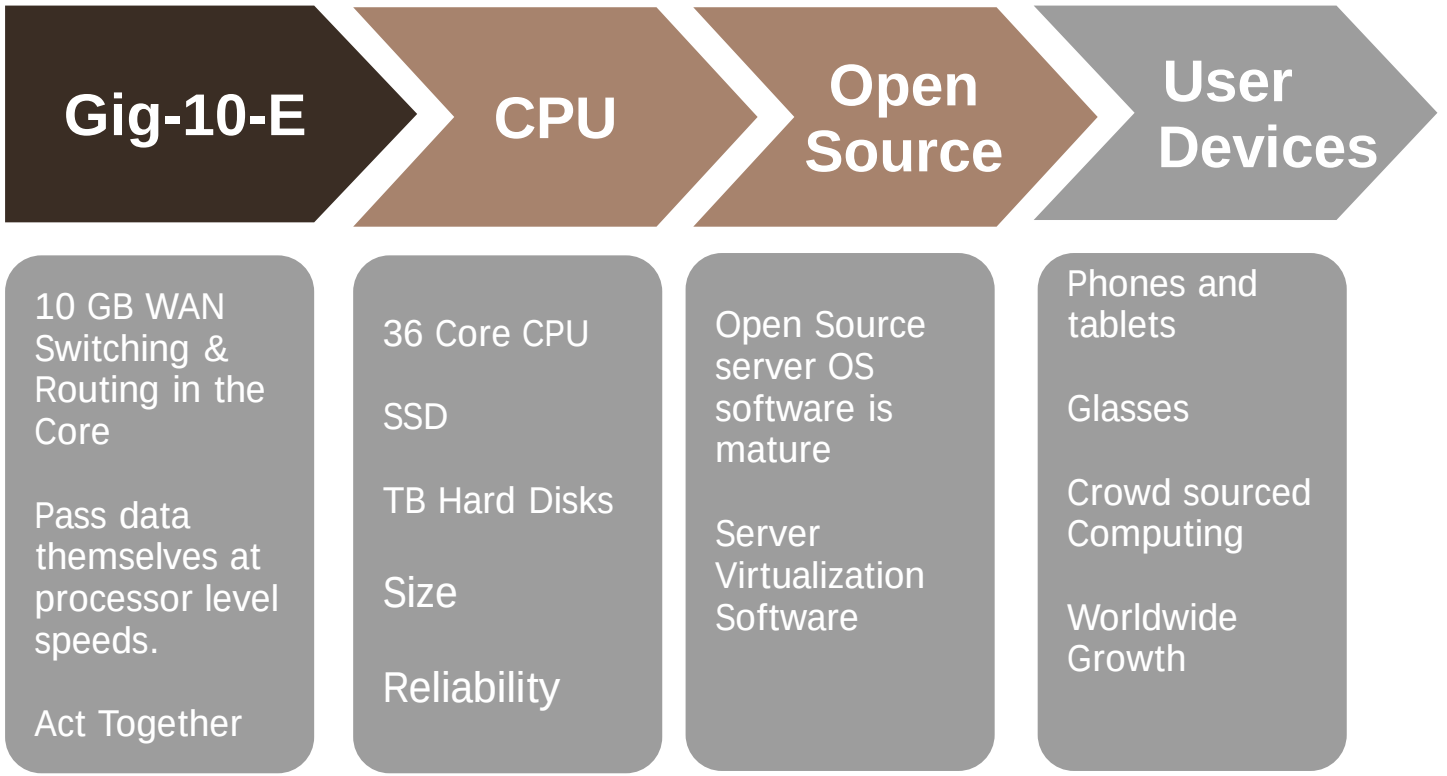
Om Networks
DCN

What we'll cover

Origination, Implications, Benefits, Drawbacks, Conclusion

Elements of the Cloud

100Gbps Net, Exceptional Hardware, Open Source, Devices



Gig-10-E Internet

10Gigabit Ethernet as well

Fiber based Internet backbones and network hardware

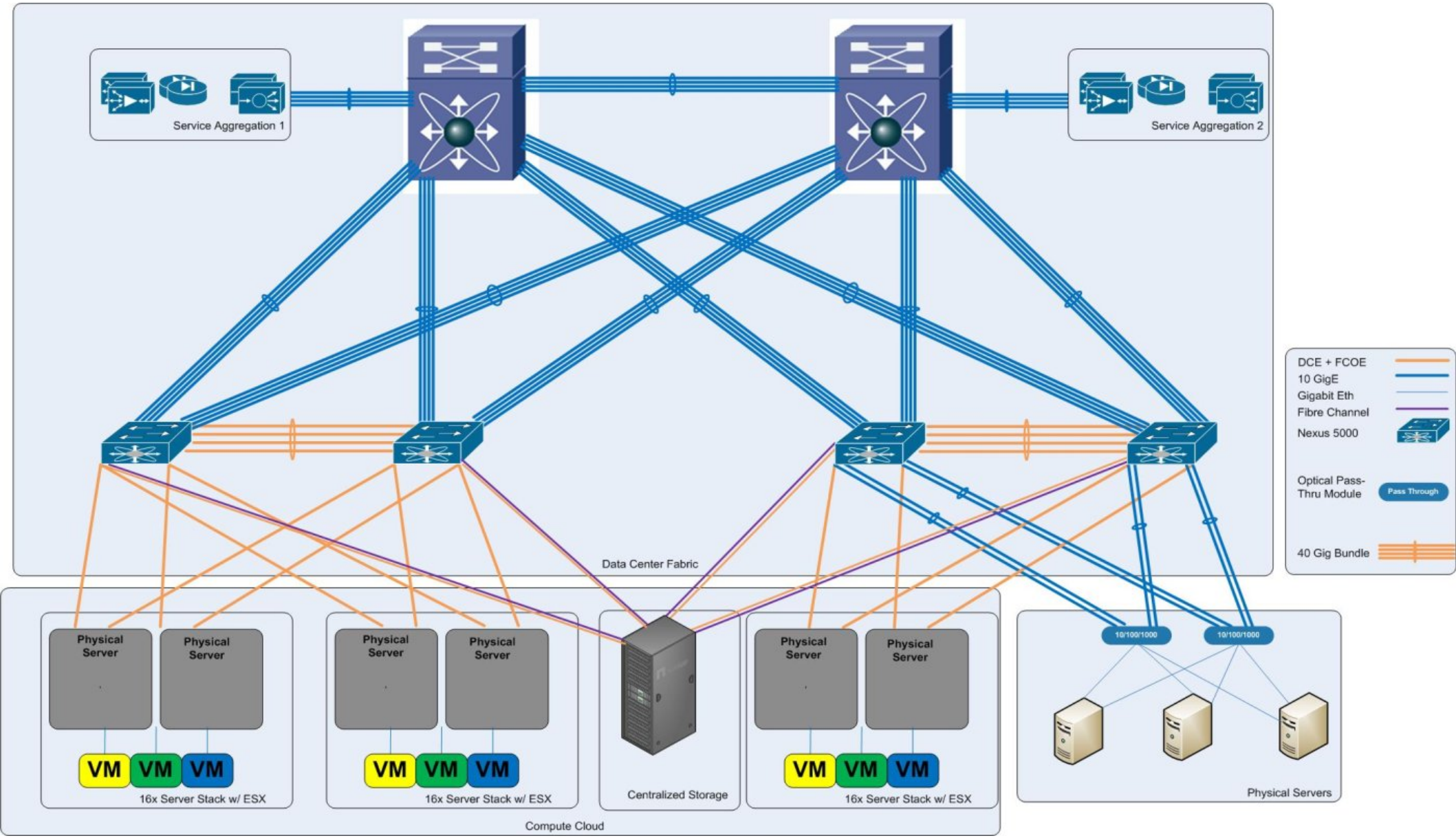
Very low microsecond response times between cloud nodes

Loads are distributed through nodes around the World

136-Gbps switching fabric with a 102-million packets per second (mpps)

100 Gbps at the Data Center Core

Network Diagram



From JM Blog - http://www.colinmcnamara.com/is-your-network-ready-for-cloud-computing-with-virtual-infrastructure-4/

High Performance

Ridiculous and crazy

32-Core CPU system common now leads to immense processing capacity increase.

SSD Disk reduced IO perfomance time to r/w data to microseconds. Reduced electrical use and failure rate

Many TB of disk space stored locally on system and on 100Gbps networked storage

Smaller energy and rackspace footprint for all networked hardware. Mostly 2U.

Over engineered redundancy and reliability with multiple components of all core systems.

Open Source Advances

Mature Server OS, Plus new Virtualization Server OS

FreeBSD, Solaris and Linux OS mature to deliver web pages, email, file transfer very quickly with minimal machine resources, and exceptional stability. Mature tech

VMware, Citrix and Xen create server virtualization possible, taking that one 32 core CPU based system and turning it into hundreds of virtual computers. Multiply and we get an exponential increase in the number of computers.

Potentially 100's of virtually distinct computers for each physical server hardware. The hypervisor manages them and invests CPU Cycles and other system resources to the systems. Good for collateral damage.

Data Processing Needs Increase

The number of networked devices accelerating

Tablets and Smartphones for consumers as well as industry. PCs, Consoles, Music Players, GPS, Tivos interacting with cloud based services are "connected to cloud"

More Data processing from all these networked devices for FB, Google & Wireless companies to manage operations and leverage for consumer data revenues

Cloud architectures are increasingly utilizing pools of existing stagnant CPU cycles to do exciting things. Genomic sequencing, BitCoin mining, Game theory problem solving

Worldwide growth of upwardly mobile consumers of networked devices another factor accelerating growth of cloud based systems

Glasses the newest gadget to connect to the cloud and the gateway to the next generation of computing. Excessive amounts of interaction through the cloud for access to ARL

These factors work together to create the “cloud” as it exists today

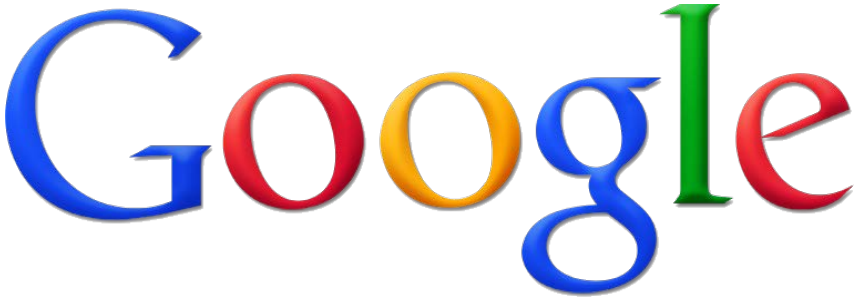
Needs and/or Uses for Cloud Power

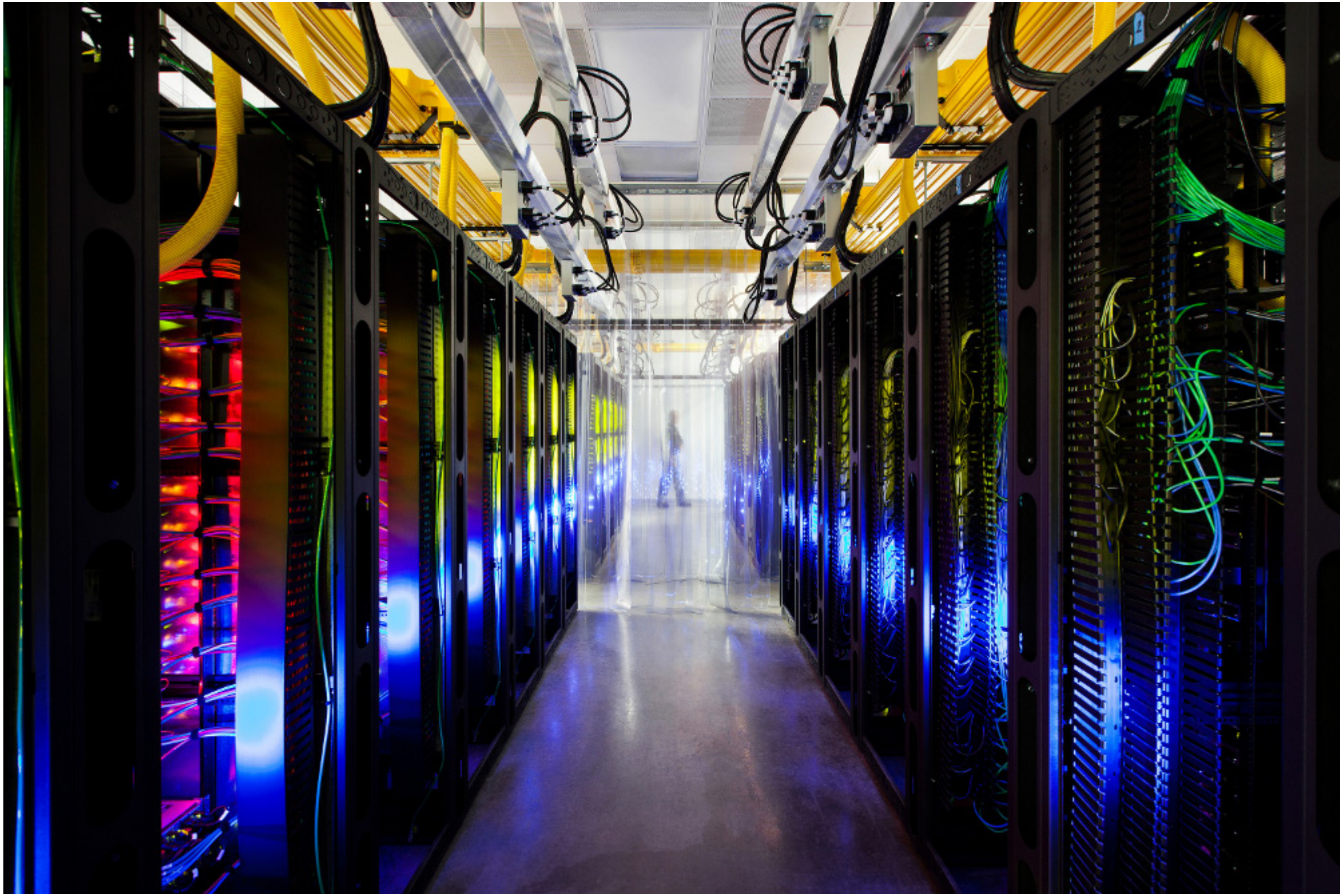
- Academic and institutional needs for data processing capacity.
- Popular Internet Infrastructure must serve billions of connections per hour from an ever increasing number of mobile, and networked devices
- Increased corporate productivity derived from mobile based and geographicaly distributed workforce collaborating through shared infrastructure
- Medical Imaging, biosciences have large redundant data storage requirements and have need for expanding computing capacity. Genome sequencing.
- Real time analytics processing is driving marketing, advertising and product delivery.
- Digital content delivery requires geographically distributed systems to send content closer to users
- 3G/4G Devices with GPS require constant interaction with the cloud to save their content to and pull content from

Institutional Cloud Heavies

- **Amazon.com**
  - S3 Network, pay as you go storage, to data centers around the world.
  - Largest “store” ever built and executed.
  - Uses RTA to offer better and more enticing products to purchase for upwardly mobile people throughout the word

- **Google**
  - Offers Free or near free services to gather immense amount of personal data to drive primary search and advertising business.
  - Also in digital content delivery business with youtube.com. Also uses RTA as Rivals.
  - Mail and associated services approximately 425 Million “active accounts” as of June 2012.





From New Google Data Center Pic Gallery @ http://www.google.com/about/datacenters/gallery/#/

Benefits

Exponentially Many and Necessary

Here to stay. Business and institutions have largely adopted cloud operations. They have to in order to scale. Individual users derive many benefits that supplement their current IT setup. More hardware development in play to look to use cloud resources. Many more devices will begin exchanging data with cloud provided network resources.

Mobility + Device Agnostic

Corporation uses one cloud based workspace. Rearrange your IT position entirely to a web and mobile focus with shared workspace to maximize opportunity, increase productivity, and drive the shareholder profits.

Access from any device.

Processing Power

Cloud computing could be running your local system setup in the cloud, having multiple copies of your computer or at least data stored in several places. In addition to your own space.

Hazards

Control is surrendered

Cloud operations is largely database controlled autonomously by management staff. Each piece of information being stored as data referenced in their database. Single point of Error is still in this incredibly complex system.

Privacy & Security of Data

Most free services have fine print claiming ownership rights on anything uploaded to their systems. They can keep content an indfinite time after deletion for analysis and monetize

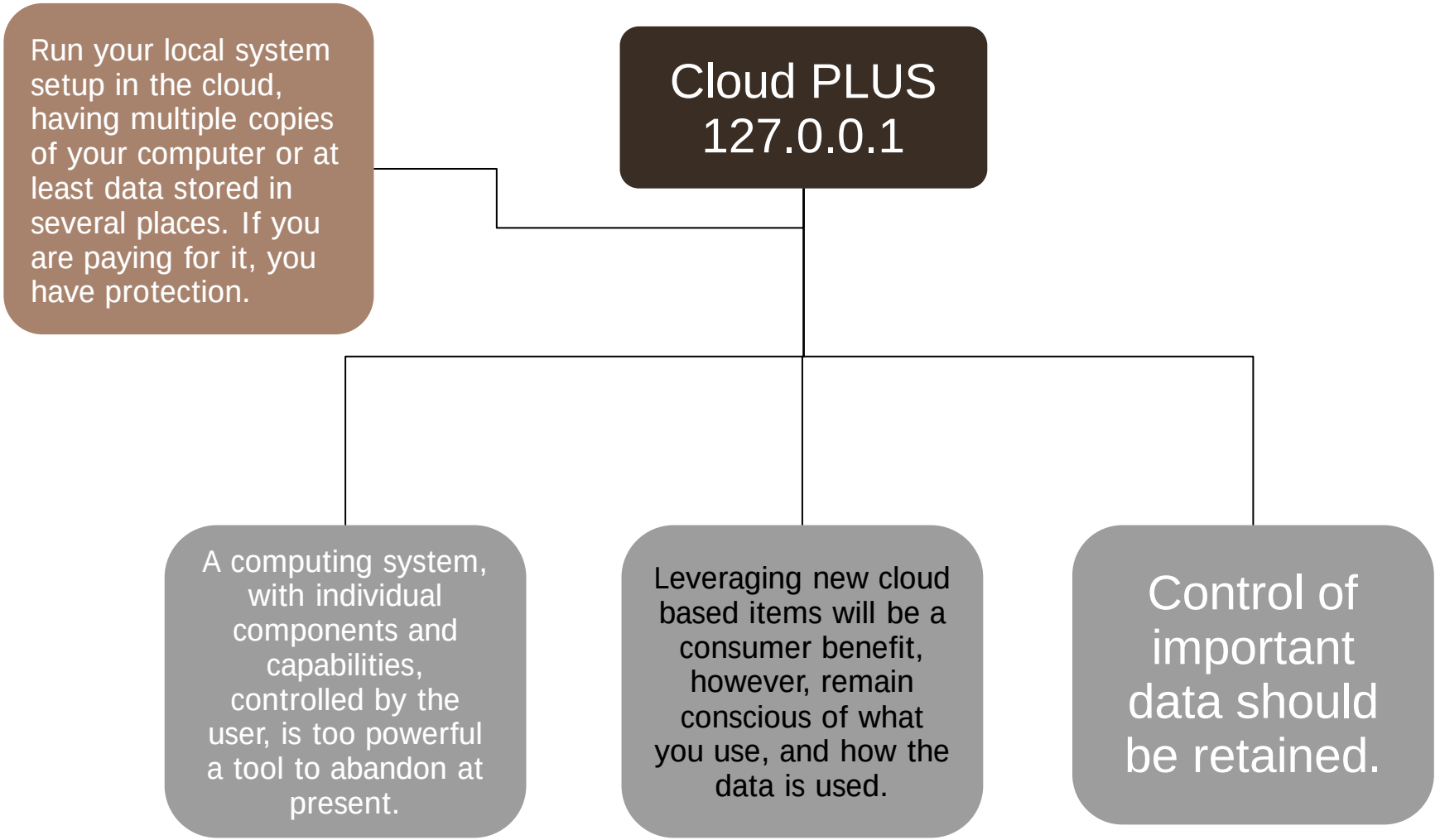
However seductive or convenient it is, that other computer system or systems your data resides on is completely out of your control, so always have a local backup at least

Attacked/ Hacked

The Internet started out with a decentralized architecture to withstand attacks, cloud computing reverses that. New Iranian and Stuxnet shows devastation of virus capabiltites on systems.

Hybridize This

Personal Preference



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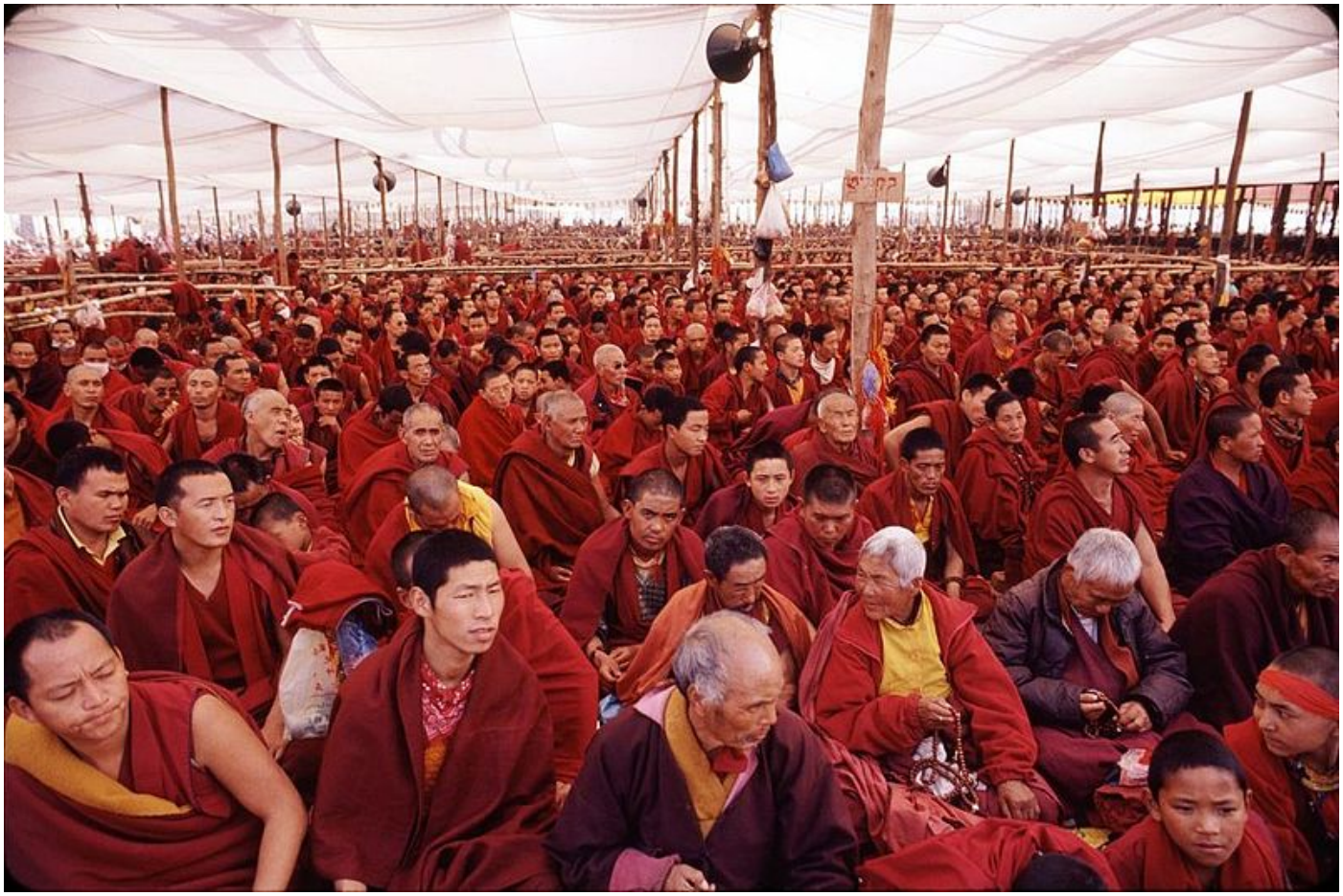

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