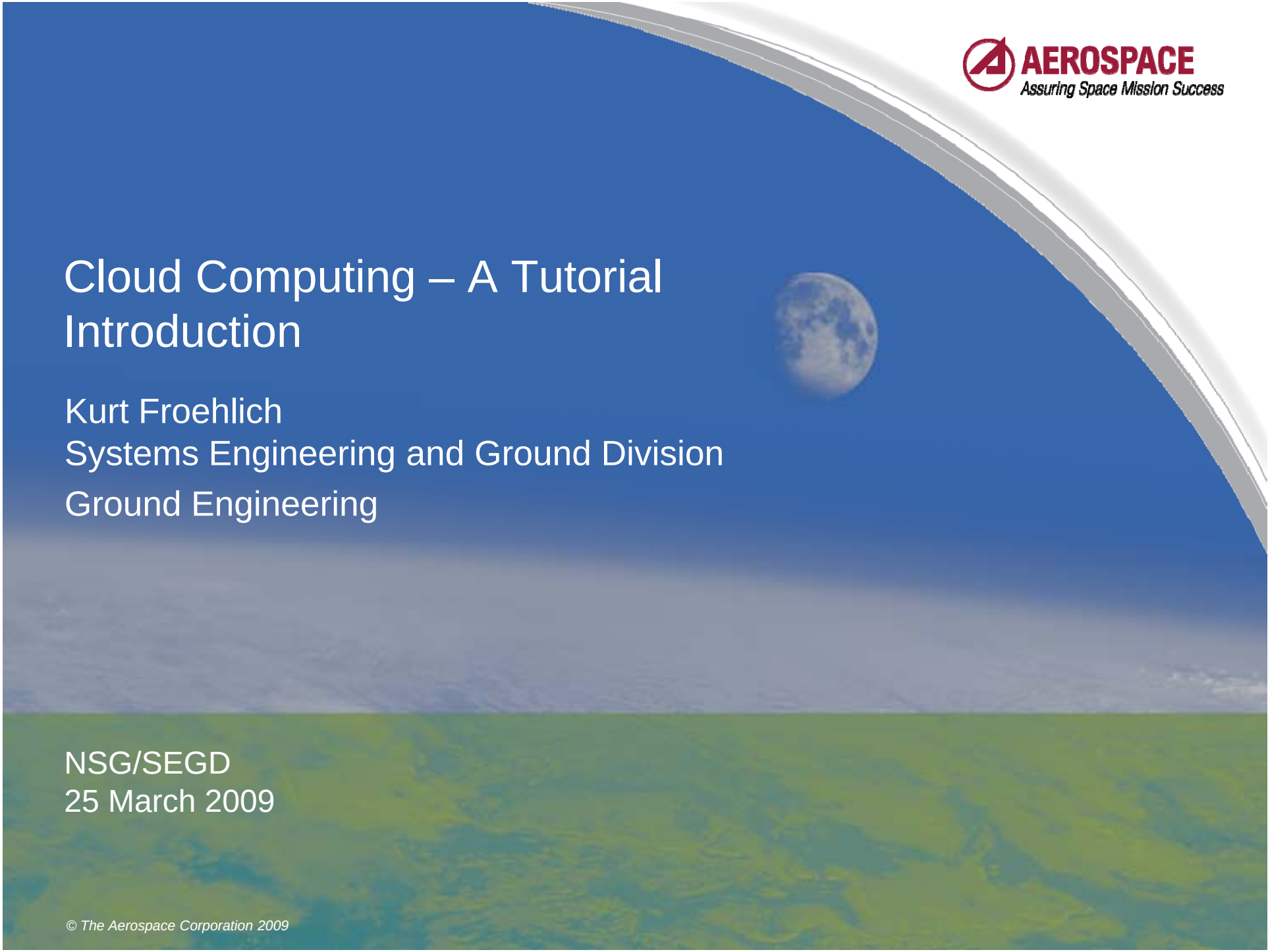


Cloud Computing – A Tutorial Introduction

Kurt Froehlich
Systems Engineering and Ground Division
Ground Engineering

NSG/SEGD
25 March 2009

Outline

- Introduction
- Requirements – Maj. Stephen Paine, USAF
- Research – Dr. Richard Wolski, UCSB
- Implementation Examples
  - *1 Darren MacLennan, force.com*
  - *2 Kevin Jackson, Dataline*
- Break
- Panel Discussion

A Taxonomy

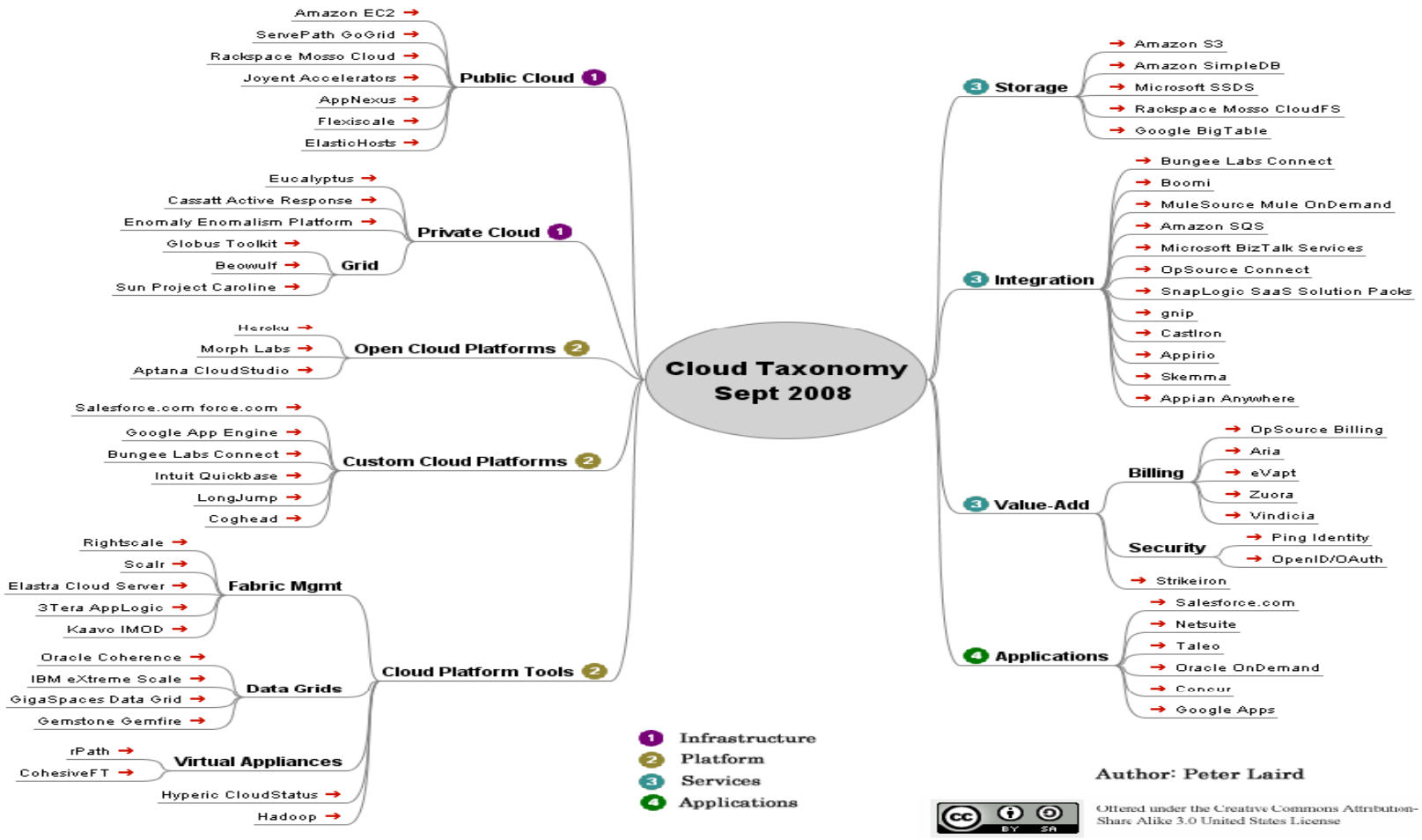
Cloud computing takes several forms --

- **Infrastructure:** the core computing resources and network fabric for the cloud deployment
- **Platform:** the software infrastructure that allows system administrators and developers to deploy an application to the cloud
- **Applications:** the ultimate cloud product - the actual cloud based application that the user touches. These number in the thousands.

The model for implementation depends on how it is to be used

A Taxonomy

a non-exhaustive, representative list (from Peter Laird's blog) --



http://peterlaird.blogspot.com/2008/09/visual-map-of-cloud-computingsaaspaas.html

What's in a name

Trends --

- Cloud computing is more of a process than one set technology. The concept behind what is now referred to as cloud computing has been called a variety of things, including cluster computing, utility computing, grid computing, and on-demand computing.
- The virtualization and abstraction of resources is the goal.
  - *It involves distributing computing tasks such as data storage and data center contents to a variety of Internet connections, software, and services accessed over a network.*
  - *This collection of servers enables users to access computing features.*
  - *The data are not anchored to one physical location.*
- The push toward open standards for cloud computing is just getting started. This trend toward using open source tools for accessing the clouds is continuing to grow.

It will take a concerted Systems Engineering effort to properly scope an implementation

Issues, Systems Engineering needs to be done

Things to consider when implementing a cloud --

- Some environments may require all hardware to have the same model of processor.
  - *Heterogeneous compute environments may not be possible*
- Security
  - *Mission Assurance*
  - *Access Control*
  - *PKI*
- COOP
- Server virtualization or true run anywhere applications and access anywhere data storage
- Methodologies for exposing services/application to users and other services/applications
- $$$$

Many considerations need to be addressed