

# **Cloud Language: The Taxonomy of On-Demand Computing**

Peter Laird  
Oracle Corporation

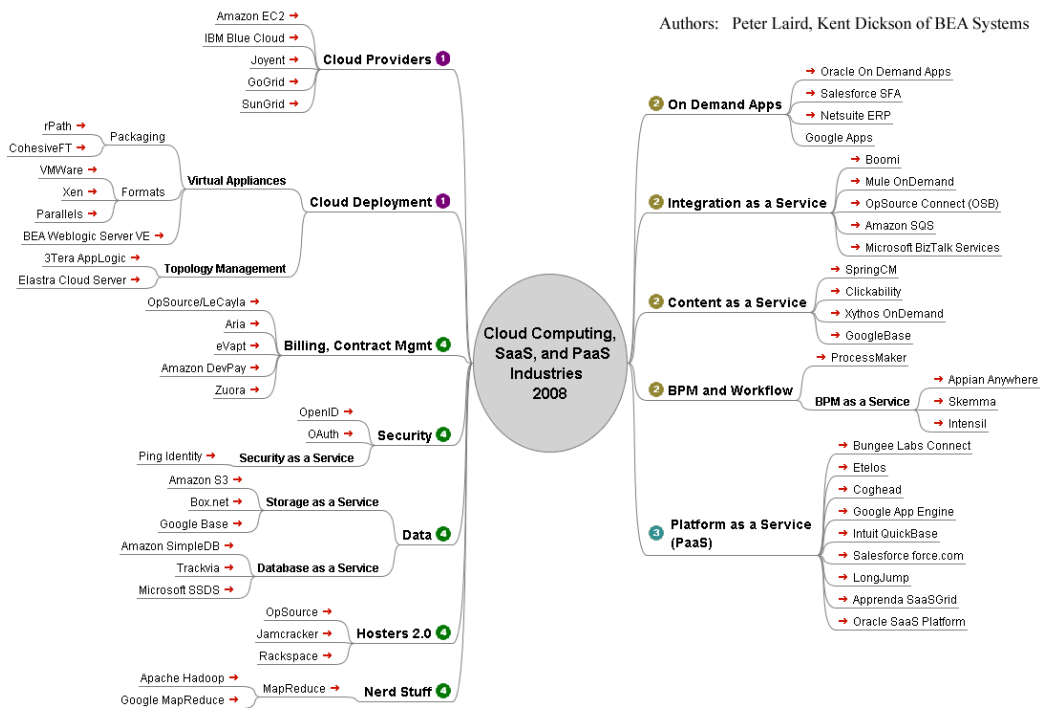
# Your Speaker – Roles at Oracle

- Lead Architect, WebCenter product family
  - Brought into Oracle in 2008 via the BEA acquisition
  - Long-time developer/architect for WebLogic Portal
  - History with customizable UI frameworks
- Architect for SaaS efforts
  - At BEA, architected the SaaS platform product
  - At Oracle, consulting architect for the SaaS Program Office

# Your Speaker – Cloud Taxonomist

- Peter blogs at <http://peterlaird.blogspot.com>
- Map of the Cloud/SaaS Space
  - [Blogged](#) on May 2<sup>nd</sup>, 2008
  - Divided the space into 4 buckets
  - Plotted 50 vendors/technologies into those buckets
- Map of the “aaS” terms
  - [Blogged](#) on May 29<sup>th</sup>, 2008
  - Enumerated the many “aaS” terms

# Laird SaaS/Cloud Map



Authors: Peter Laird, Kent Dickson of BEA Systems

1 Cloud Computing | 2 SaaS | 3 PaaS | 4 Core Cloud Services

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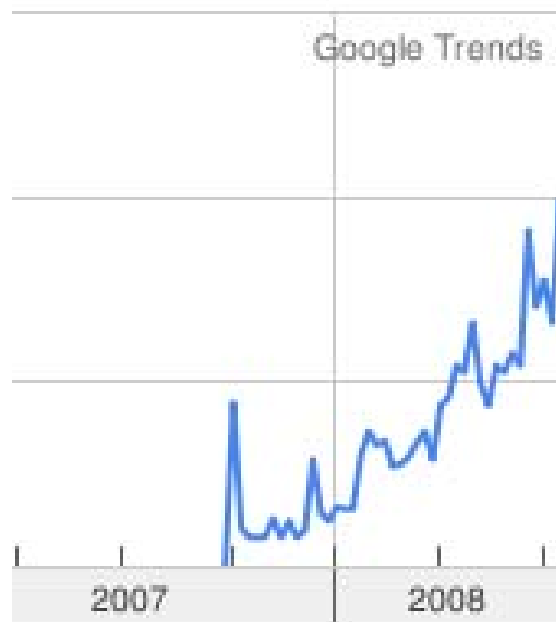
# Agenda

- Defining Cloud Computing
- Taxonomies of the Cloud Space
- Related Concepts and Terms
- Vendor Landscape

# Defining Cloud Computing

# Cloud Computing

- Active community
  - Many bloggers covering the space
  - Cloud Computing [Google Group](#) getting 600 posts per month
- Usage of the term swelled in late 2007
- But...



# Cloudy Terminology

- “Cloud Computing” is impossible to define in a way that satisfies all, ...
  - ...or even a majority.
  - Many writers have tried
- We will look at a handful of definitions
- Speaker has chosen one as a working definition for the purposes of this presentation
- Cloud Computing is not alone in controversy
  - Web 2.0, Mashups, RESTful Architecture



# Cloudy, Cloudy, Cloudy, Cloudy

Term	Origin	Year*	Notes
<b>Web 2.0</b>	O'Reilly Media	2005	Often confused with RIA. AKA Social Computing, Long-Tail Apps, Crowdware.
<b>Mashup</b>	-	2005 <sup>1</sup>	Made popular by Google Maps. AKA Composite/Situational Apps.
<b>REST</b>	R. Fielding	2006 <sup>2</sup>	Has a strict definition, but many don't understand it and abuse the term.
<b>Cloud Computing</b>	-	2007	Collides with many other terms, such as SaaS, Grid, Utility, PaaS, etc.

\* Column refers to year of emergent popularity, not first use. Source: Google Trends



# The Definition is in Progress...

**“There’s a Darwinian evolution of the exact definition of cloud computing running around. We’re about a country mile away from “knowing when I see it”, which is excellent progress. The cloud to everyone’s silver-lining has enough material to write a 3 volume desktop reference at this point.”**

**- Michael Coté, June 2008**



# Definition #1

**“Cloud Computing is the realisation of Internet (‘Cloud’) based development and use of computer technology (‘Computing’) delivered by an ecosystem of providers.”**

**- Sam Johnston, July 2008**



# Definition #2

**“Cloud Computing = Network Computing**

**...**

**I love the idea of cloud computing, the next evolution of the most network intensive architecture possible, but one that if it works well, is transparent. It’s all about the transparency.”**

**- Douglas Gourlay, Cisco, May 2008**



# Definition #3

**“There seems to be a group myopia around so-called ‘cloud computing’ and it’s definitions. What we’re really talking about are ‘cloud services’ of which, ‘computing’, is only a subset...Cloud services are not SaaS. They are far more akin to web services...”**

**- Randy Bias, neoTactics, May 2008**



# **(Anti-)Definition #4**

**“Note that I refer to cloud services, not to the cloud. I am not interested in defining cloud as a term, because I don’t think it very useful. For those of us in the distributed computing space, cloud is the latest buzzword to compete with the word grid in terms of utter ambiguity.”**

**- Robert Anderson, Digiepede, July 2008**



# The Working Definition

**“...the notion of providing easily accessible compute and storage resources on a pay-as-you-go, on-demand basis, from a virtually infinite infrastructure managed by someone else. As a customer, you don’t know where the resources are, and for the most part, you don’t care. What’s really important is the capability to access your application anywhere, move it freely and easily, and inexpensively add resources for instant scalability.”**

**- Mitchell Crandell, Rightscale, June 2008**

# The Taxonomy of Cloud Computing

# Cloudiness, Again

- Taxonomies are useful to provide insight into a market
  - Classifies a multitude of players into smaller buckets
- No surprise that segmenting a poorly defined space will lead to only more controversy
- Will cover several approaches, covered in chronological order



# Andreessen's Platforms, Sept 07

- Provided an early taxonomy model for emerging cloud platforms
- Platform being a system that can be programmed
  1. Access API – platform that provides web service end points
  2. Plug-In API – platform invokes your code, that you have deployed remotely
  3. Runtime Environment – your code runs inside the platform's process space

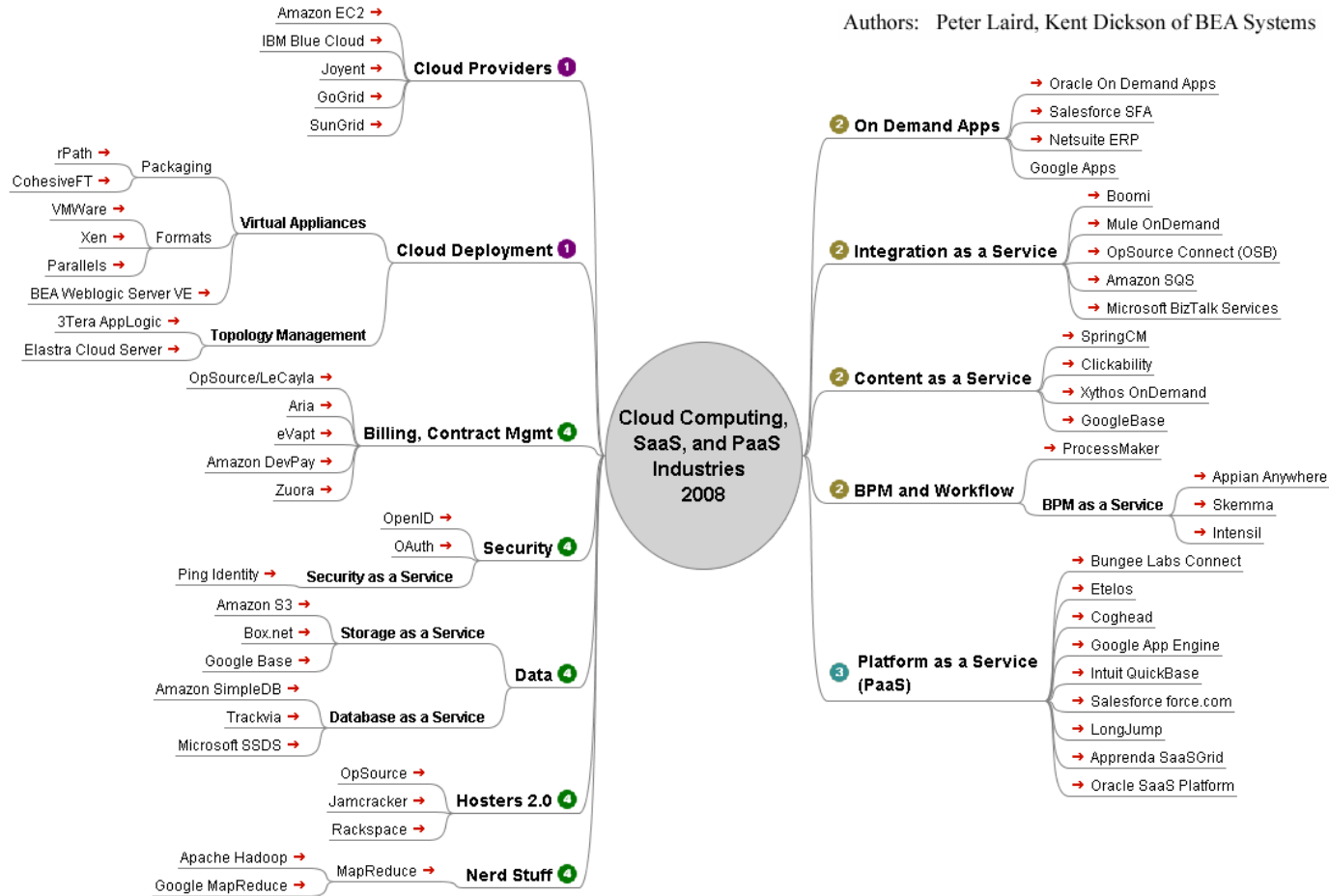


# Mehta 11 Layer Stack, April 08

1. Facilities (space, power, cooling)
2. Network
3. Hardware (e.g., servers Amazon EC2 runs)
4. Hardware Virtualization (e.g., Xen for EC2) - optional
5. O/S (e.g., Linux)
6. Systems Management (e.g., tools to manage EC2 instances)
7. Application Middleware (e.g., MySQL on EC2)
8. Application Code
9. Application APIs / Web Services
10. GUI for Application
11. GUI for Application Development / Customization

# Laird SaaS/Cloud Map, May 08

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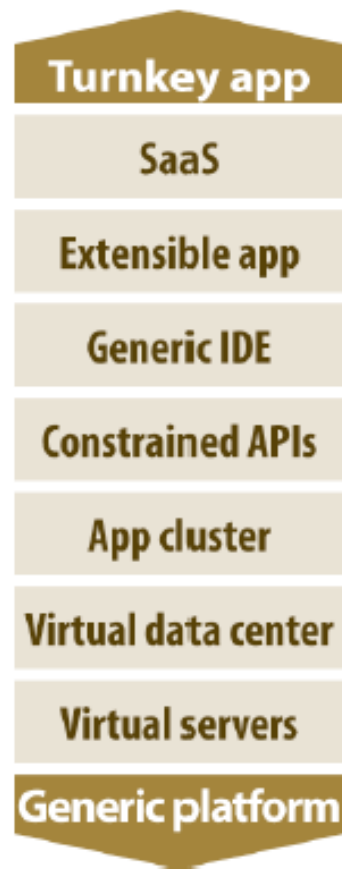
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# Croll Cloud Stack, June 08

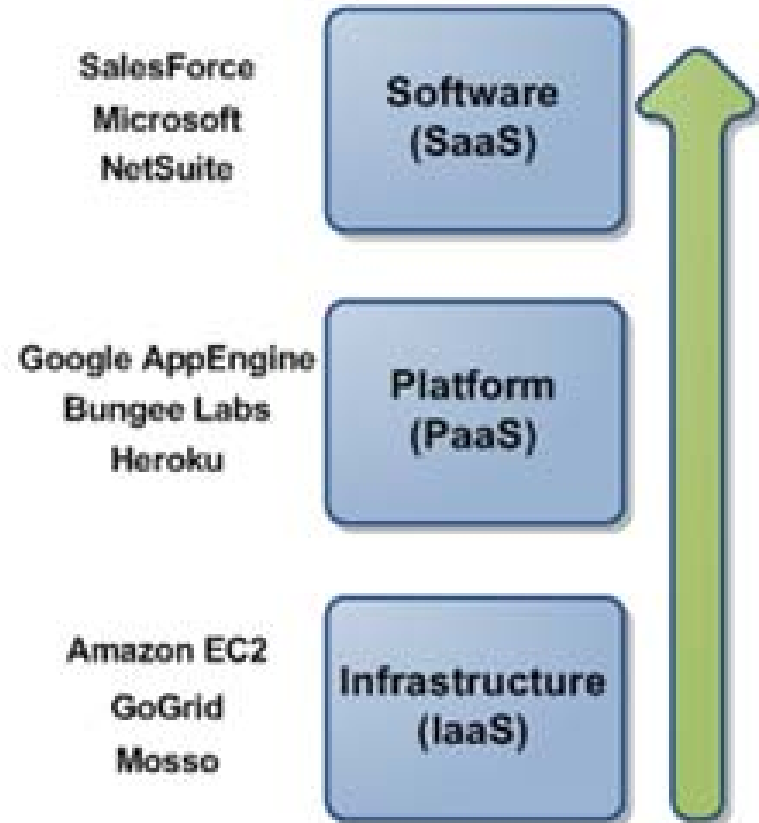
- 7 layer stack
  - Bottom of stack includes “root access” style compute clouds
  - App clusters full featured development environments to deploy cloud apps
  - Constrained APIs are dev environments with limitations
  - Extensible apps are highly customizable pre-built applications





# Robert Anderson 3 Layers, July 08

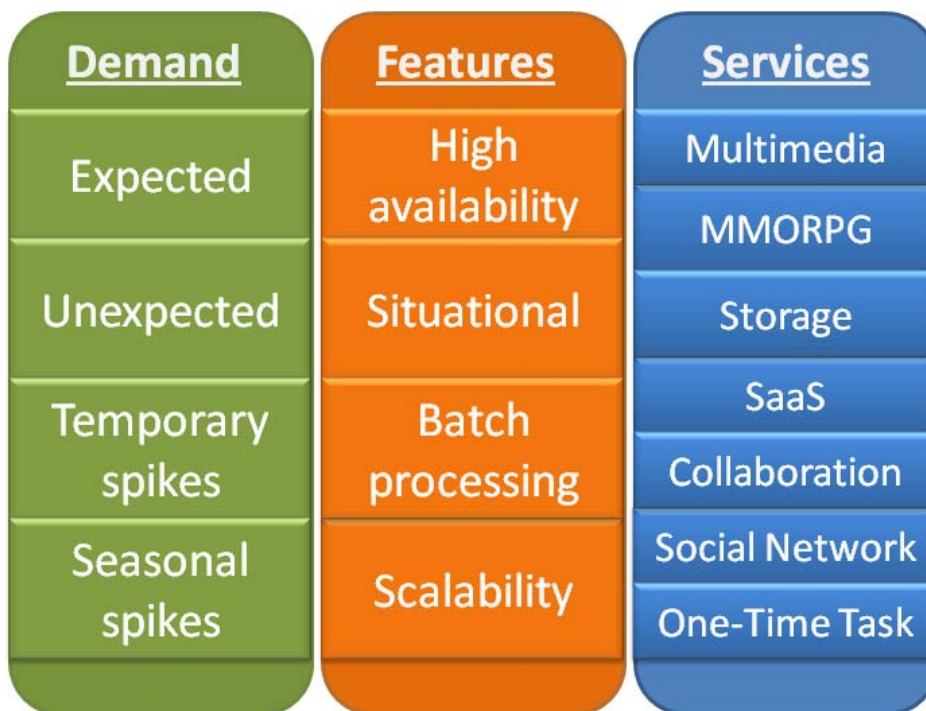
- Robert introduced this taxonomy model
- Identifies 3 layers:
  - Cloud Applications
  - Cloud Platform
  - Cloud Infrastructure
- We will adopt as our model taxonomy for this session





# Klems Apps Taxonomy, July 08

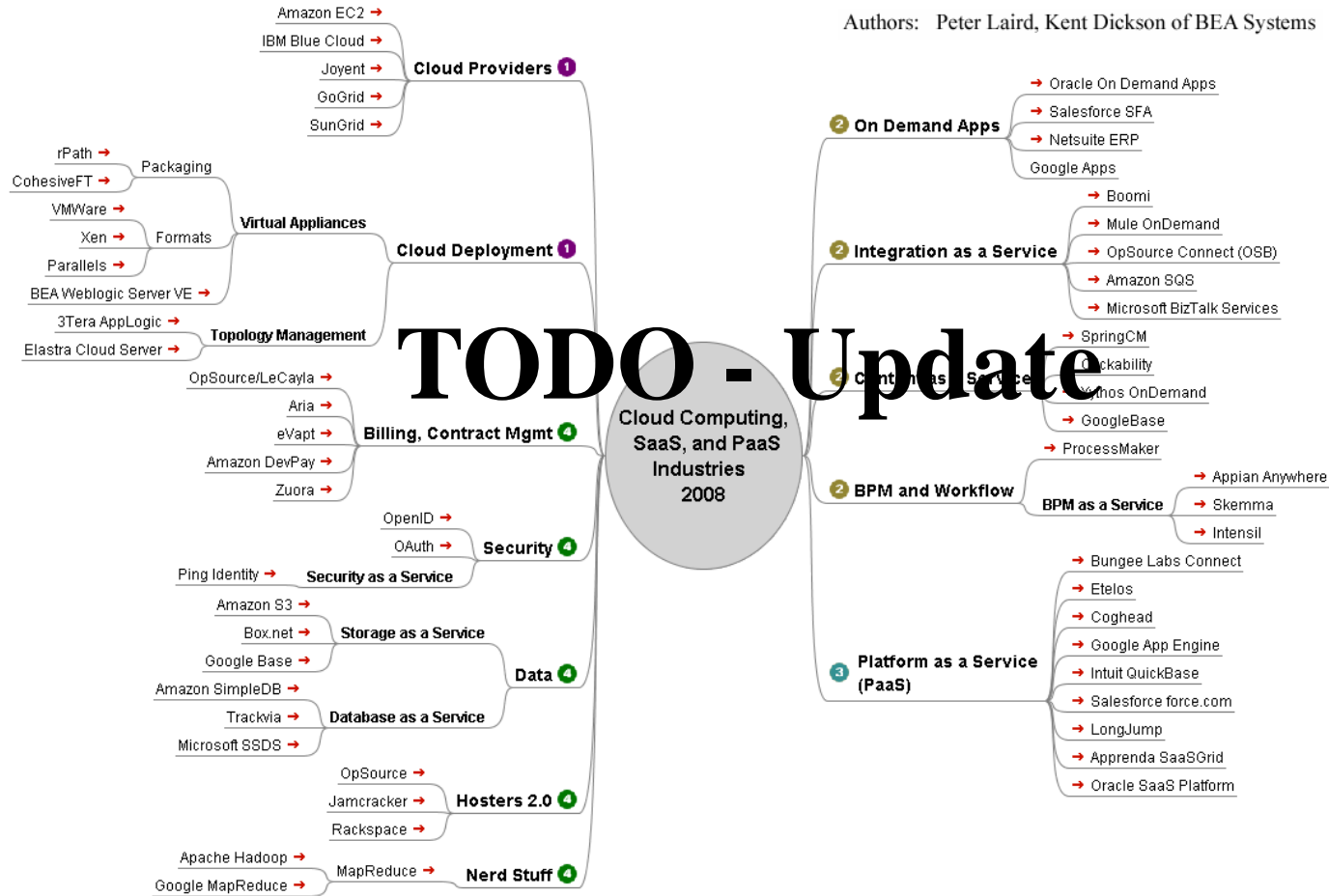
Morphological Analysis of Apps&Services



© Markus Klems, Version 0.2

# Laird SaaS/Cloud Map, Aug 08

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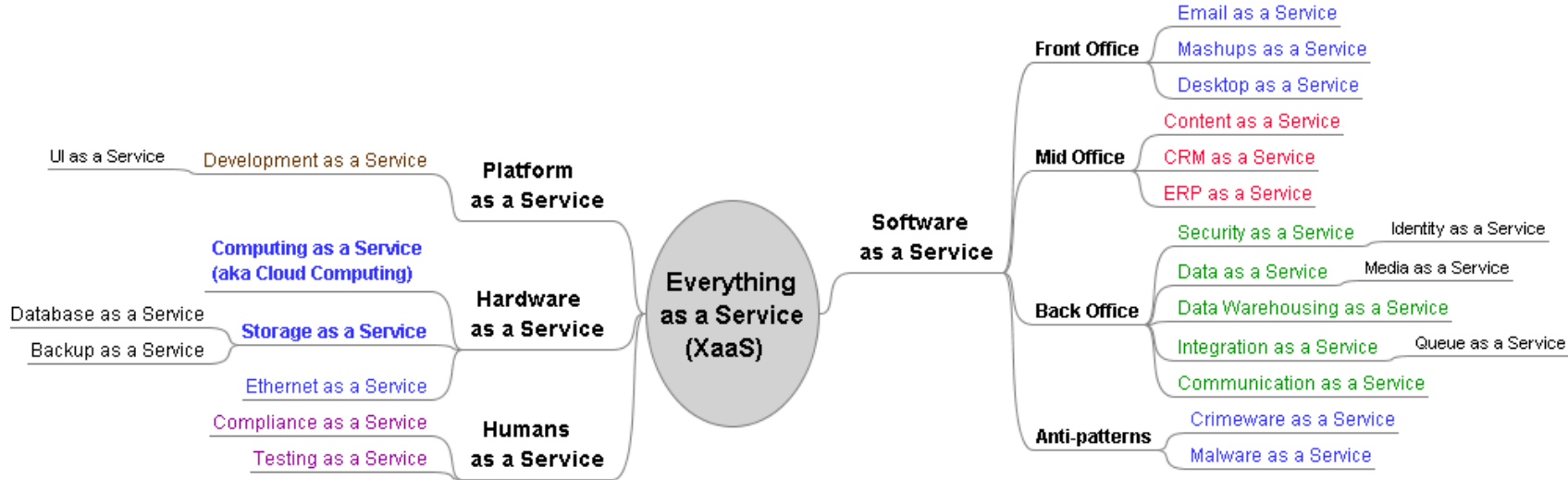
# Related Terms



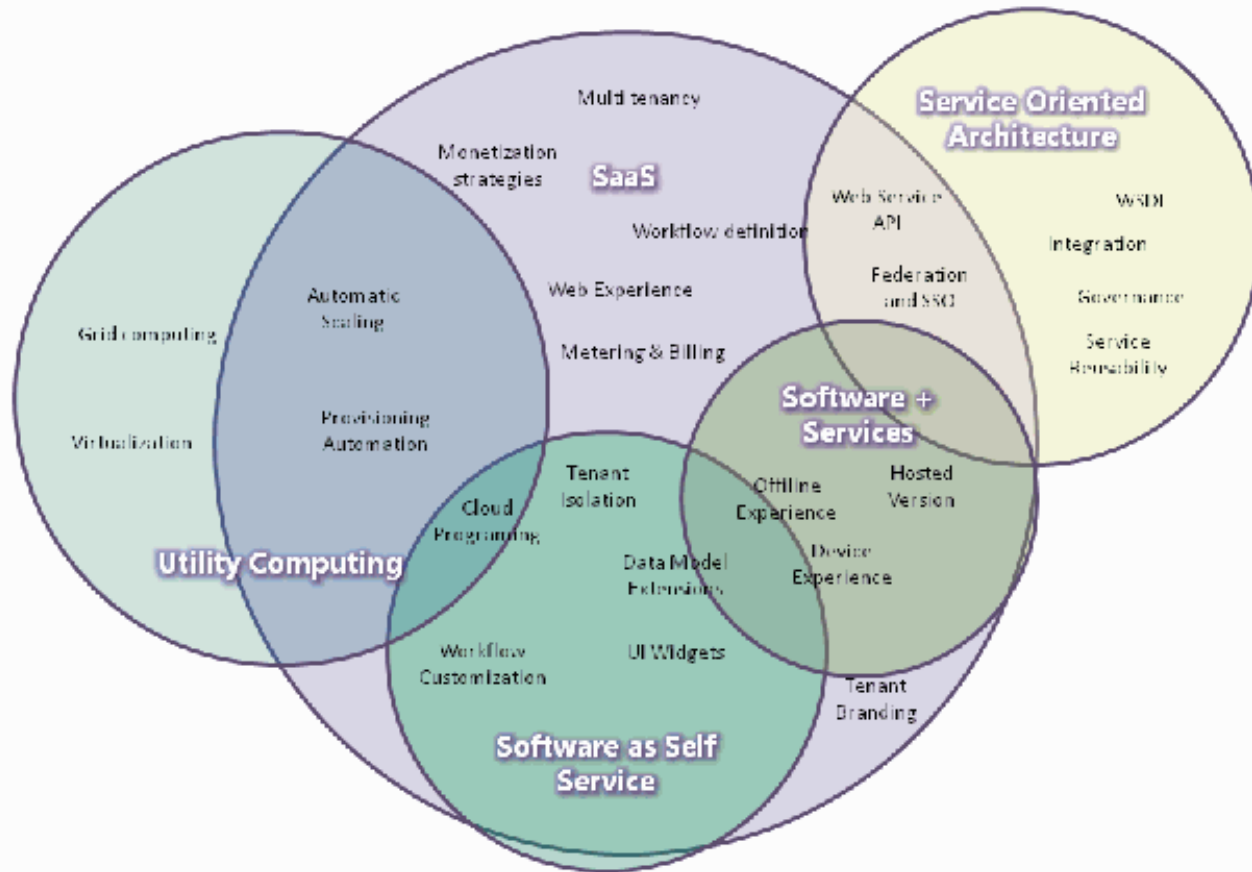
# Cloudiness, Again

Grid PaaS Cloud  
SaaS HaaS  
Utility OnDemand  
Hosting  
Autonomic  
Virtualization MSP  
Distributed

# Laird XaaS Map, May 08



# Woloski SaaS Taxonomy, July 08



# Cloud Infrastructure

- Infrastructure as a Service (IaaS), Hardware as a Service (HaaS)
  - Synonyms to Cloud Infrastructure
- Virtualization
  - A technology that abstracts the coupling between the hardware and operating system
- Hosting
  - Providing raw computers in a data center to customers
- Autonomic Computing
  - A technology that enables computers to be self-managing

# Cloud Infrastructure

- Distributed Computing
  - Very generic, refers to splitting the execution of a program up across multiple machines
- Grid Computing
  - Assembles multiple heterogeneous computational resources into a larger logical machine
  - Grid historically have been used to execute computationally expensive jobs
  - Can scale up and down as load demands
  - Can be the back-end to clouds

# Cloud Applications

- **Software as a Service (SaaS)**
  - Application is hosted by the application creator
  - Usage based, subscription pricing
  - Delivered over the internet
- **Software + Services (S+S)**
  - Popularized by Microsoft
  - Combines SaaS with some on-premise software
- **Managed Service Provider (MSP)**
  - Similar to Hosting, but includes services higher up into the application stack

# The Rest

- Platform as a Service (PaaS)
  - Maps directly to the Cloud Platform tier
- OnDemand
  - High level term, can be applied to all 3 tiers
- Utility Computing
  - Providing computation and storage like a public utility like electricity and water
  - Synonym to OnDemand

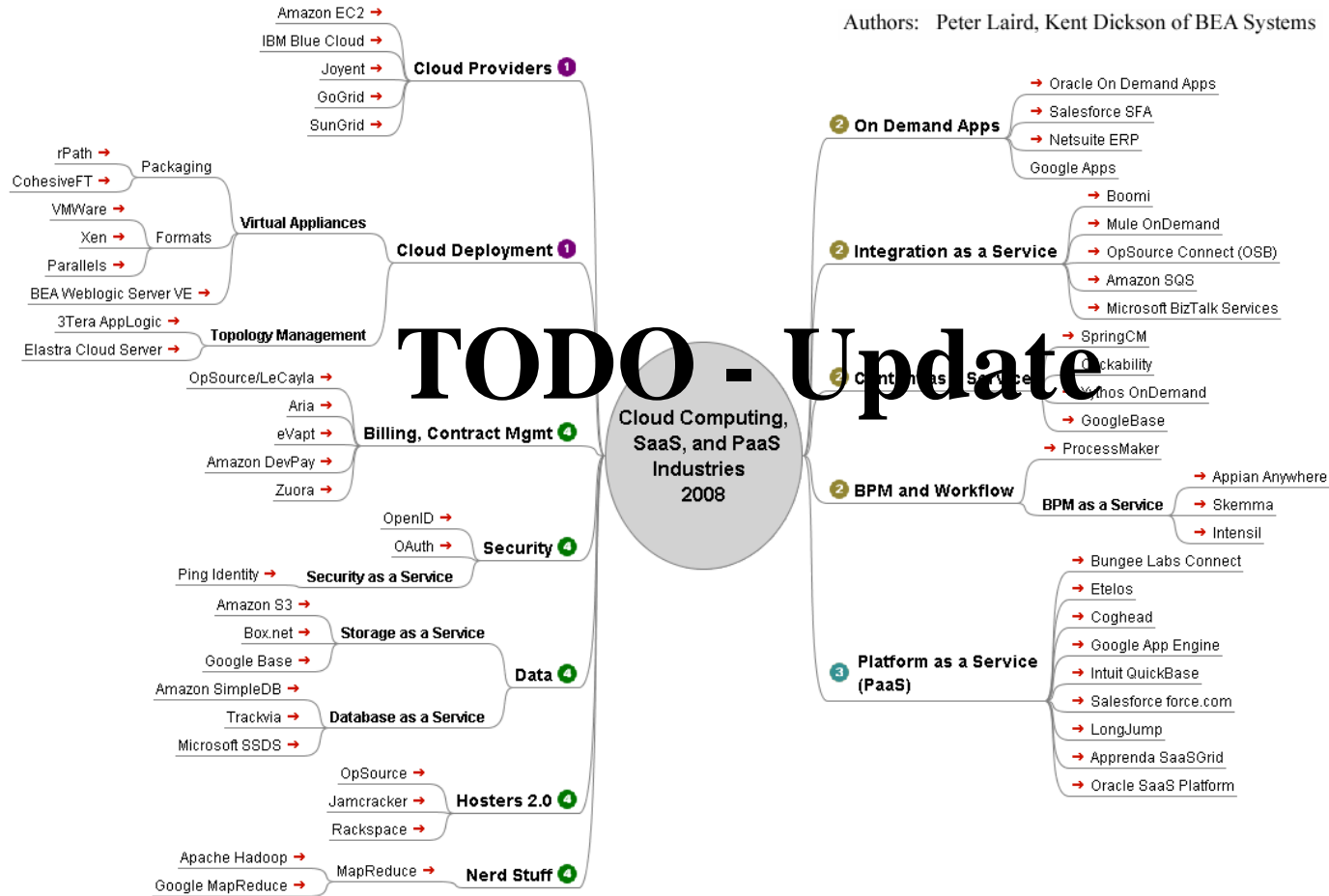
# Vendor Landscape

# Woloski SaaS Taxonomy, July 08



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