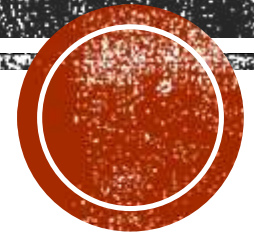


CLOUD STRUCTURE AND SERVICES



DEFINITION

- Model for enabling convenient, on-demand network access to shared pool of configurable computing resources
- (e.g., networks, servers, storage, applications, and services)
- Rapidly provisioned and released with minimal management effort or service provider interaction.

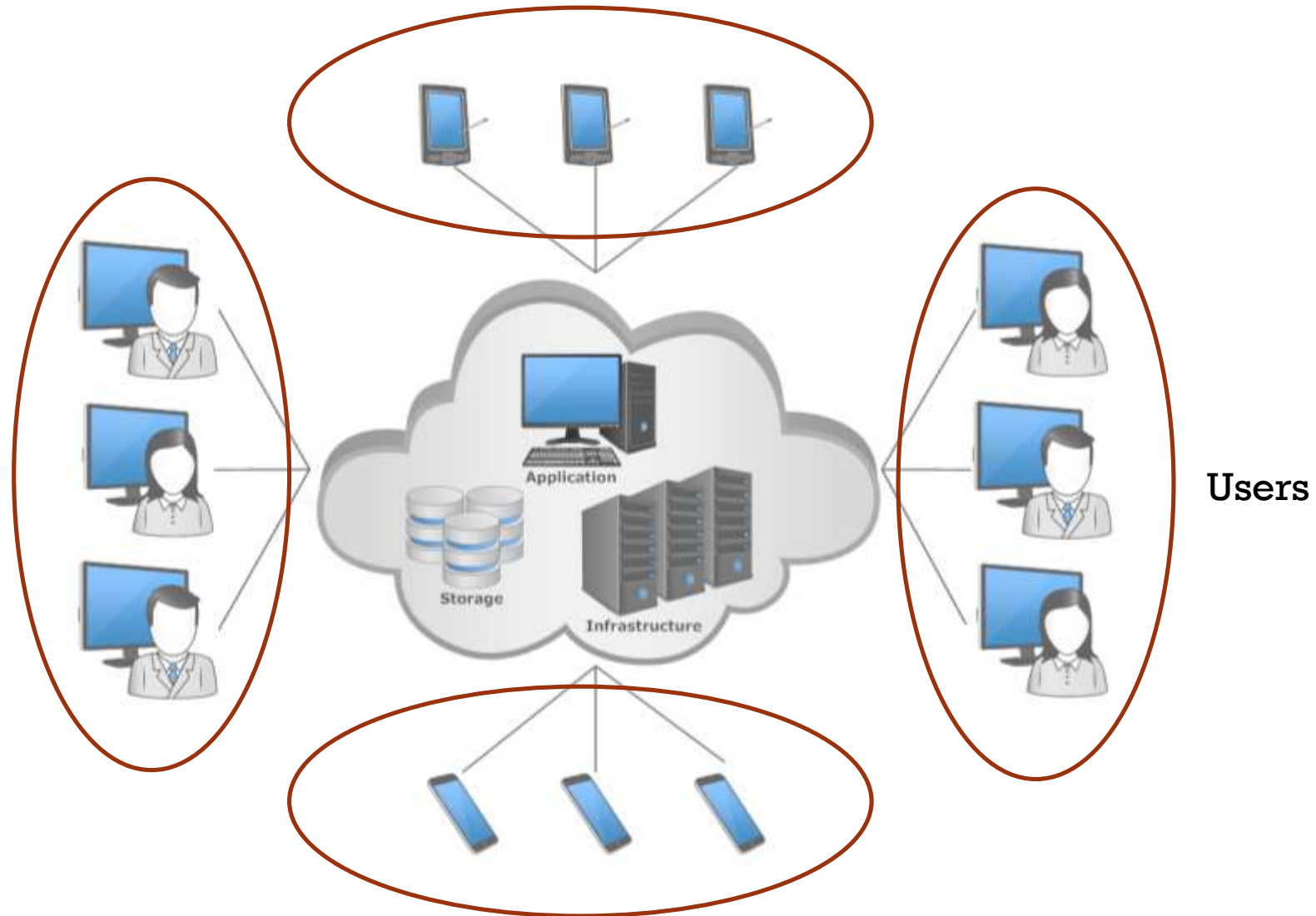


DEFINITION

- Five Essential Characteristics
 - On-demand self-service
 - Broad network access
 - Resource pooling
 - Rapid elasticity
 - Measured Service



STRUCTURE – OVERVIEW



STRUCTURE — THE PLAYERS

- Cloud Providers
 - Data Centers
- Users
 - Personal users
 - Organizations
 - Other Clouds



ADVANTAGES

- Flexibility
 - Ideal for businesses with growing or fluctuating bandwidth demands
- Disaster recovery
 - Smaller businesses that lack the required cash and expertise
 - “Small businesses twice as likely to implement cloud-based backup and recovery solutions” (Aberdeen Group)
- Automatic software updates
 - Servers off-premise, out of sight and out of your hair
 - Suppliers roll out regular software updates – including security updates
- Capital-expenditure Free



ADVANTAGES (CONT.)

- Increased collaboration
 - Teams can access, edit and share documents anytime, anywhere
- Work from anywhere
 - As long as you've got an internet connection you can be at work
 - Most serious cloud services offer mobile apps
 - Study - 42% of workers would swap an avg of 6% of pay for the ability to telecommute
- Document control
 - No sending files back and forth as email attachments
 - No mess of conflicting file content, formats and titles
 - Files are stored centrally and everyone sees ONE version of the truth.



ADVANTAGES (CONT.)

- Security
 - No more lost laptops with sensitive data inside
 - Can even remotely wipe data from lost laptops
- Competitiveness
 - Access to enterprise-class technology
 - Smaller businesses can act faster than big, established competitors, while remaining lean and nimble
- Go global in minutes
 - Easy deployment of applications in multiple regions around the world with just a few clicks
 - Implies lower latency and better experience for customers
- Environmentally friendly
 - Only use the energy you need
 - Don't leave oversized carbon footprints



CONCERNS

- Availability of a Service
 - Downtime = Losses
 - Google Search has set a high standard, effectively the dial tone of the Internet
- Data Lock-in
 - Cannot easily extract data and programs from one provider to another
 - Could lead to arm-twisting, and extortion
- Data Confidentiality and Auditability
 - Public networks expose system to more attacks
- Data Transfer Bottlenecks
 - Applications continue to become more data-intensive
 - Applications may be “pulled apart” across the boundaries of clouds



CONCERNS (CONT.)

- Performance Unpredictability
 - Shared, pooled resources lead to contention
- Scalable Storage
 - Difficult to implement cheaply
- Scaling Quickly
 - If scale ups not fast enough, Service Level Objective (SLO) violations occur
 - If scale downs not fast enough, costs increase



CONCERNS (CONT.)

- Reputation Fate Sharing
 - Resources like IP addresses all shared
 - One bad user could give the whole cloud a bad name
 - E.g. IP address blacklisted
- Software Licensing
 - How would that work?



CLOUD SERVICES

- SaaS – Software as a Service
 - Offers completed product that is run and managed by the service provider
- PaaS – Platform as a Service
 - Focus on the deployment and management of applications
- IaaS – Infrastructure as a Service
 - Typically offers access to:
 - Networking features
 - Computers (virtual or on dedicated hardware)
 - Data storage space

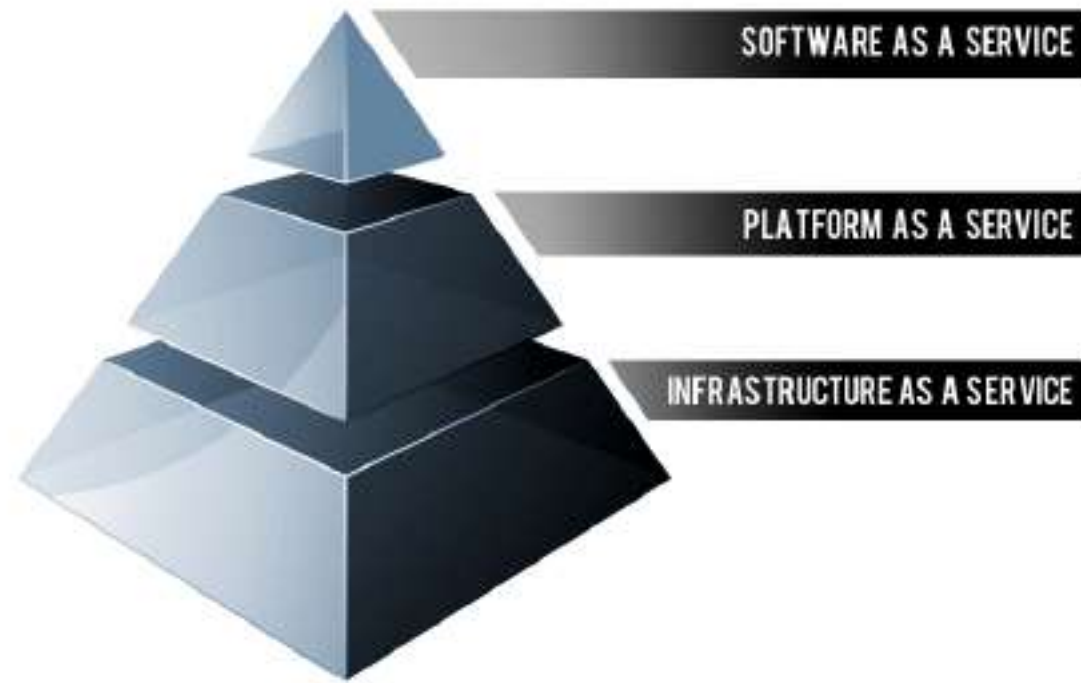


CLOUD SERVICES (CONT.)

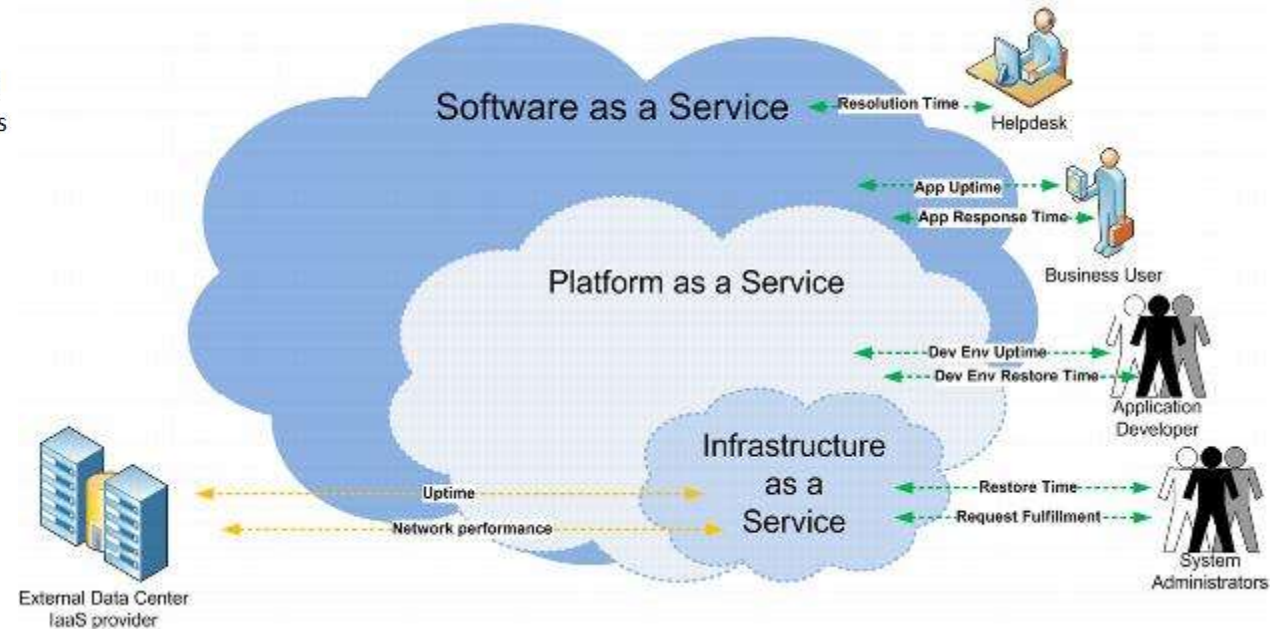
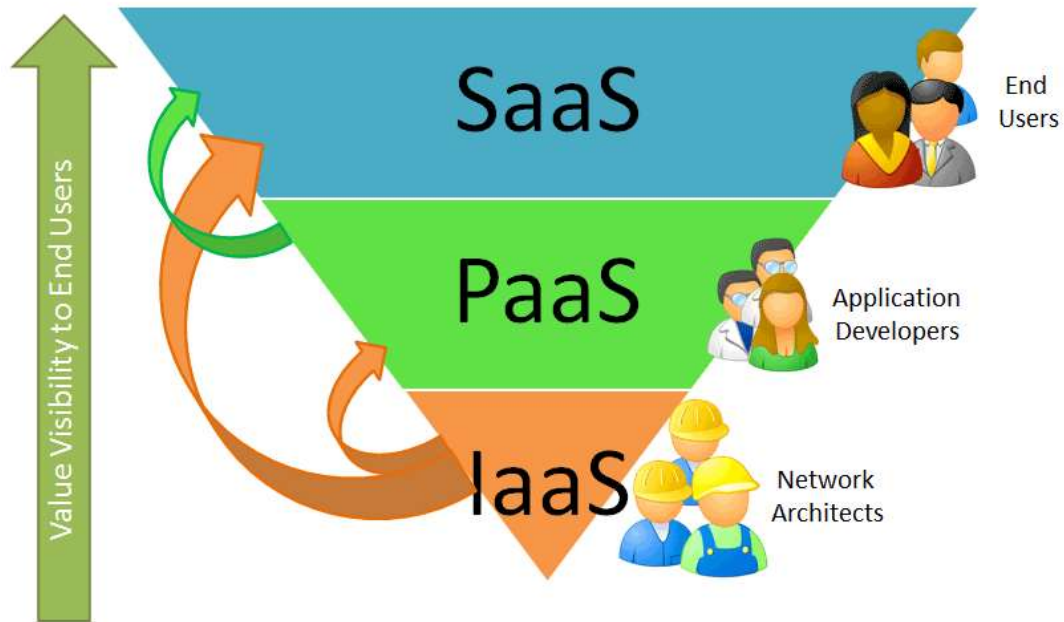
- Imagine the Interstate transportation system in the U.S
- Even with all the roads built, they'd be useful without cars and trucks to transport people and goods
- Think of the roads as the infrastructure
- The cars and trucks are the platform that sits on top of the infrastructure
- The goods and people can be the software and information



CLOUD SERVICES (CONT.)



CLOUD SERVICES (CONT.)



CLOUD SERVICES — SAAS

- Software that is deployed over the internet
- Provider licenses an application to customers in one of the following
 - Through a subscription (“pay-as-you-go” model)
 - At no charge (revenue other than user –advertisement or user list sales)
- Characteristics:
 - Web access to commercial software
 - Software is managed from a central location
 - Software delivered in a “one to many” model
 - Users not required to handle software upgrades and patches
 - Application Programming Interfaces (APIs) allow for integration between different pieces of software
- Examples – Gmail, Google Apps, Office 365,



CLOUD SERVICES — SAAS



CLOUD SERVICES — SAAS

- Where SaaS makes sense:
 - “Vanilla” offerings where the solution is largely undifferentiated (e.g. email)
 - Applications with significant interplay between the organization and the outside world (e.g. newsletter campaign software)
 - Applications with significant need for web or mobile access (e.g. mobile sales management software)
 - Short term need software (e.g. collaboration software for a specific project)
 - Software with significant periodic demand spikes (e.g. tax software)



CLOUD SERVICES — SAAS

- Where SaaS does NOT make sense:
 - Applications with extremely fast processing of real time data required
 - Applications where legislation or other regulation prohibits data being hosted externally
 - Applications where an existing on-premise solution fulfills all of the organization's needs



CLOUD SERVICES — PAAS

- Computing platform that allows the creation of applications quickly and easily
- No buying and maintaining the software and infrastructure underneath it
- Characteristics:
 - Services to develop, test, deploy, host and maintain applications in the same integrated development environment
 - Web based user interface creation tools to create, modify, test and deploy different UI scenarios
 - Multi-tenant architecture with multiple concurrent users using the same development application
 - Integration with web services and databases via common standards
 - Support for development team collaboration (maybe project planning and communication tools)
 - Tools to handle billing and subscription management
- Examples – Apprenda, Salesforce Heroku, AWS Elastic Beanstalk, Microsoft Azure, Engine Yard



CLOUD SERVICES — PAAS



CLOUD SERVICES — PAAS

- Where PaaS makes sense:
 - When multiple developers will be working on a development project
 - When other external parties need to interact with the development process
 - Orgs with existing data source (e.g. sales information) who want to create applications to leverage that data
 - Where developers wish to automate testing and deployment services
 - Projects using the agile software development methodologies (iterative and incremental development)



CLOUD SERVICES — PAAS

- Where PaaS does NOT make sense:
 - When application needs to be highly portable in terms of where it is hosted
 - When proprietary languages or approaches would impact the development process
 - When a proprietary language would hinder later moves to another provider
 - When application performance requires customization of the underlying hardware and software



CLOUD SERVICES — IAAS

- Way of delivering on-demand servers, storage, network and operating systems
- Characteristics:
 - Resources are distributed as a service
 - Allows for dynamic scaling
 - Has a variable cost, utility pricing model
 - Generally includes multiple users on a single piece of hardware
- Examples - Amazon Web Services (AWS), Cisco Metapod, Microsoft Azure, Google Compute Engine (GCE), Joyent



CLOUD SERVICES – IAAS



CLOUD SERVICES — IAAS

- Where IaaS makes sense:[when we want to make website or code from the scratch]
 - Where demand is very volatile[provide elasticity]
 - For new organizations without the capital to invest in hardware
 - Where the organization is growing rapidly[and drop quickly]
 - For specific line of business, trial or temporary infrastructural needs
 - IaaS
 - PaaS
 - IaaS

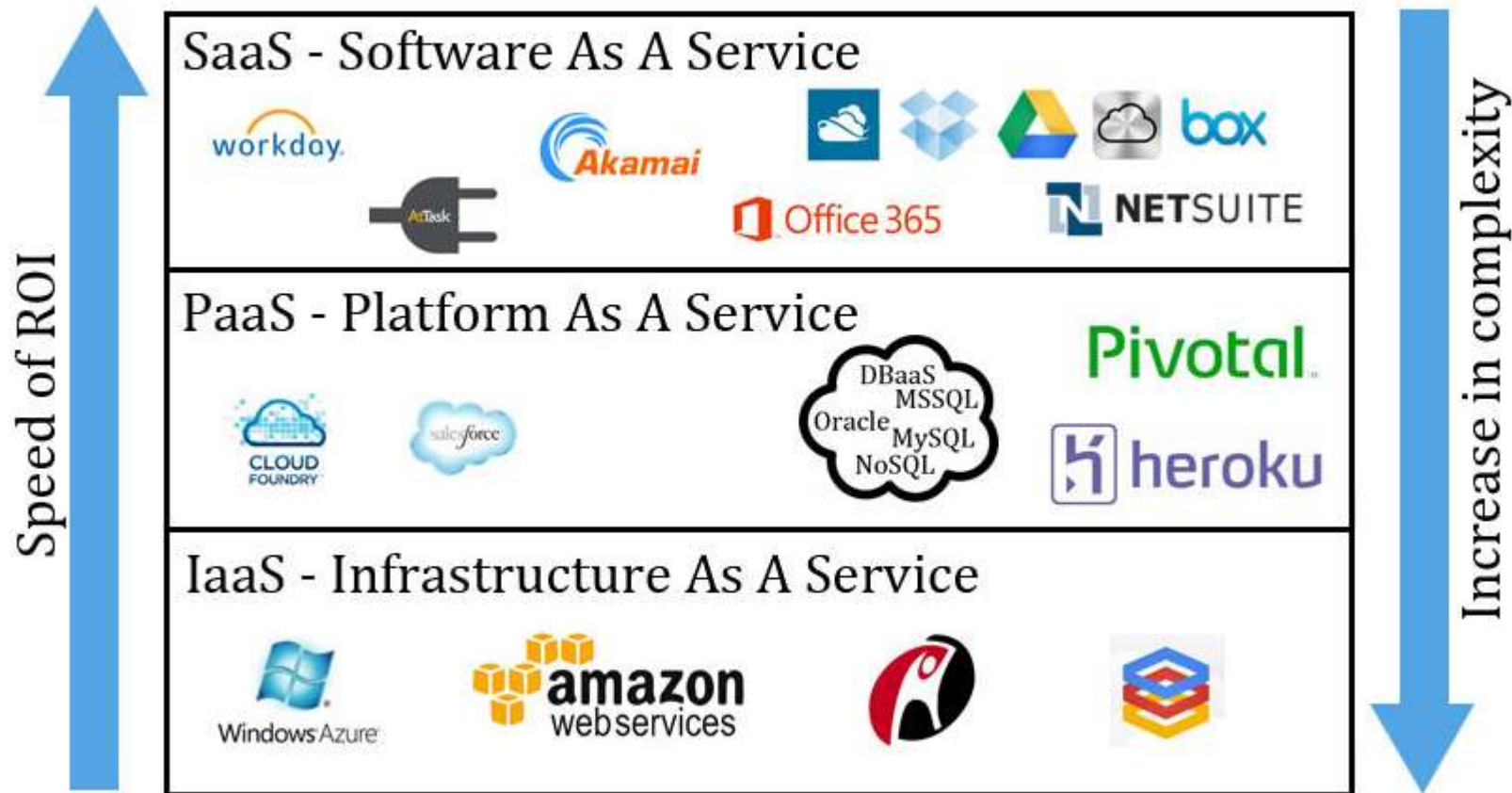


CLOUD SERVICES — IAAS

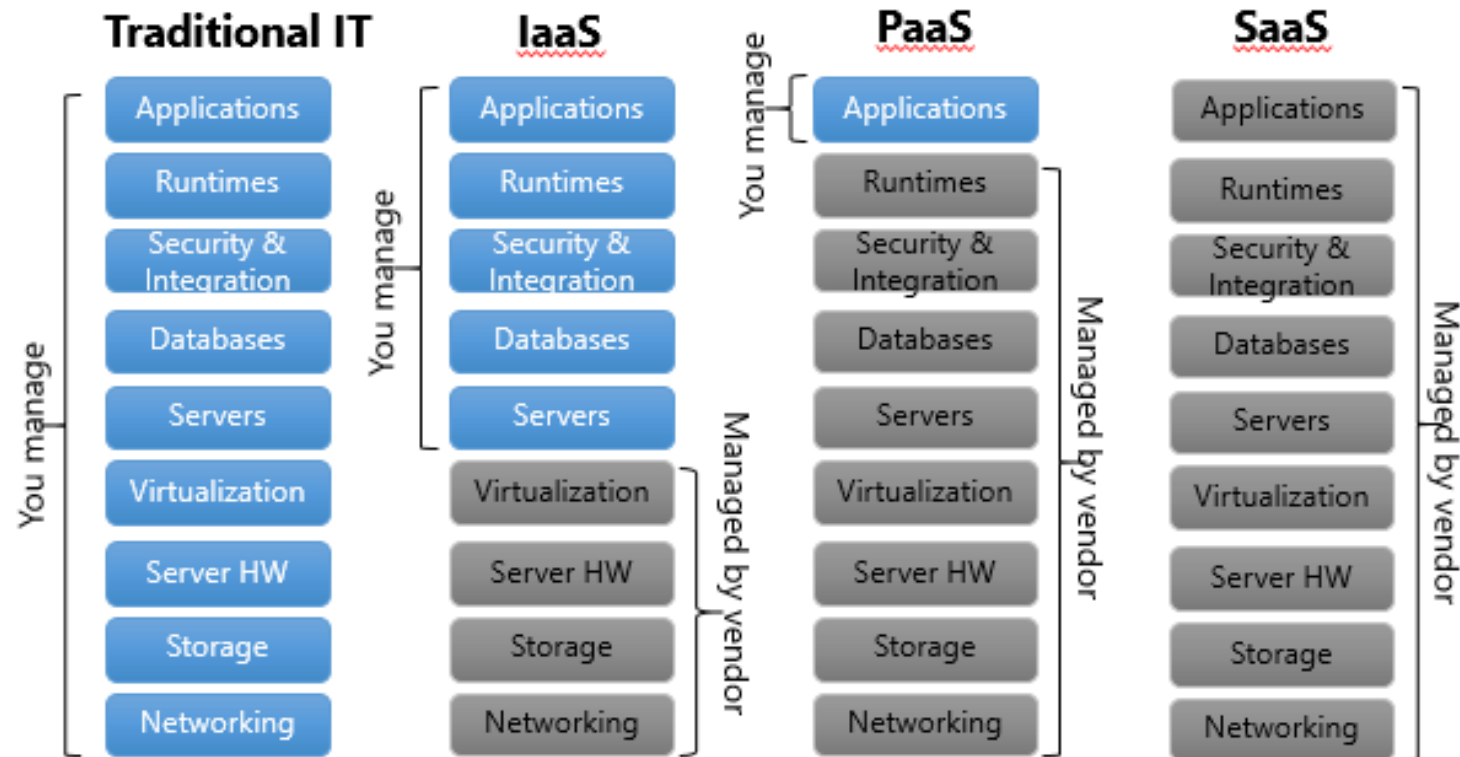
- Where IaaS does NOT make sense:
 - Where regulatory compliance makes offshoring or outsourcing difficult
 - Where the highest levels and guarantees (almost 100%) of performance are required



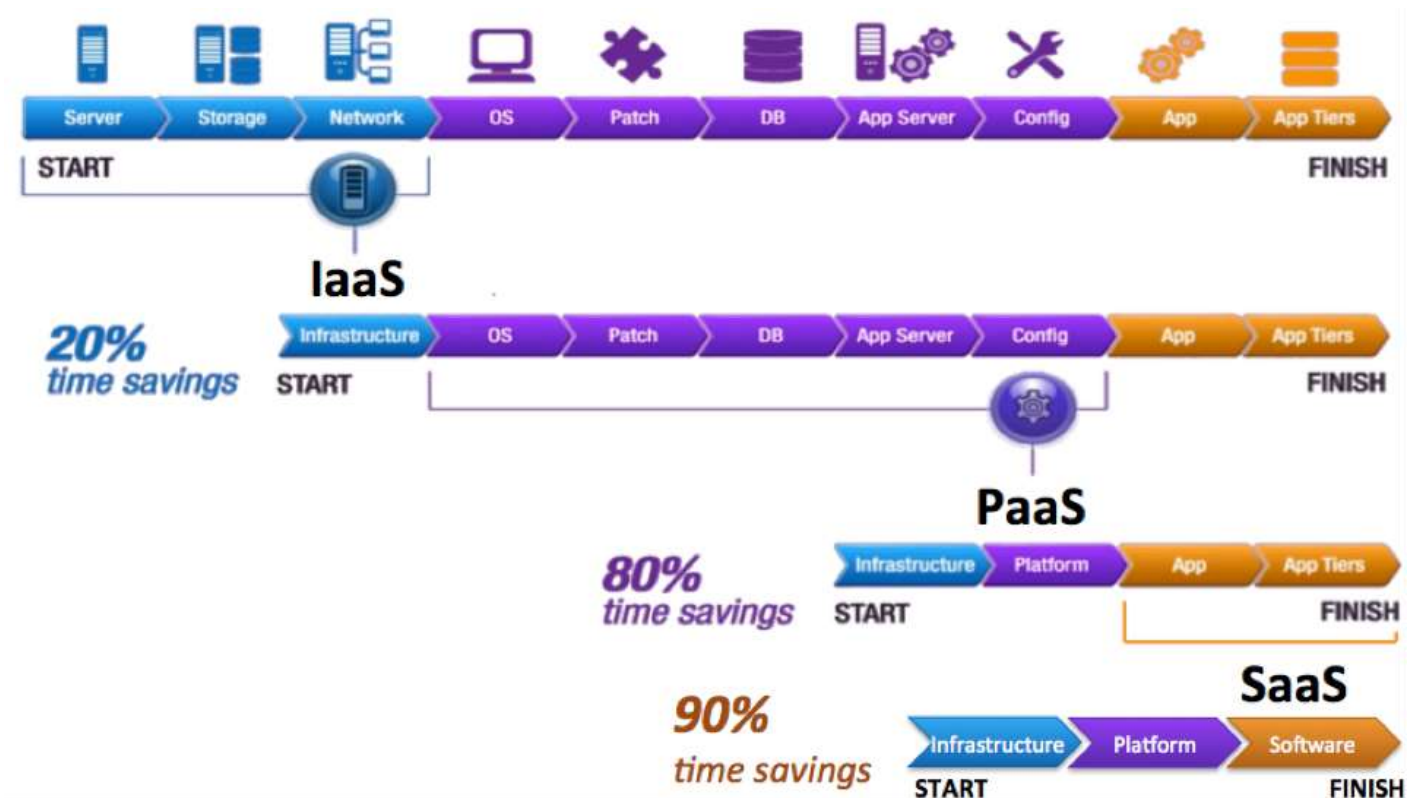
CLOUD SERVICES – SUMMARY



CLOUD SERVICES – SUMMARY



CLOUD SERVICES – SUMMARY



REFERENCES

- <https://support.rackspace.com/white-paper/understanding-the-cloud-computing-stack-saas-paas-iaas/>

