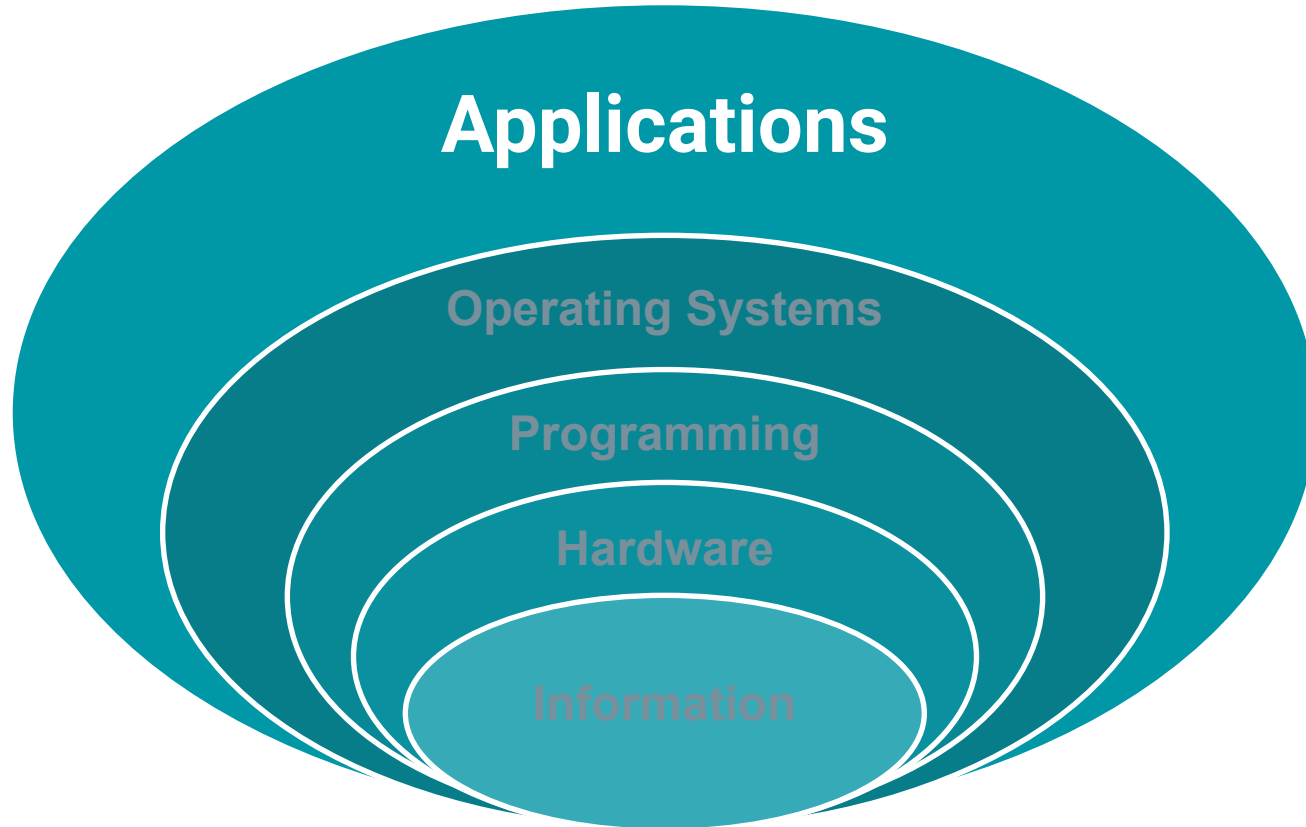


Fundamentals of IT

Lecture 2: Applications Layer

Today's focus

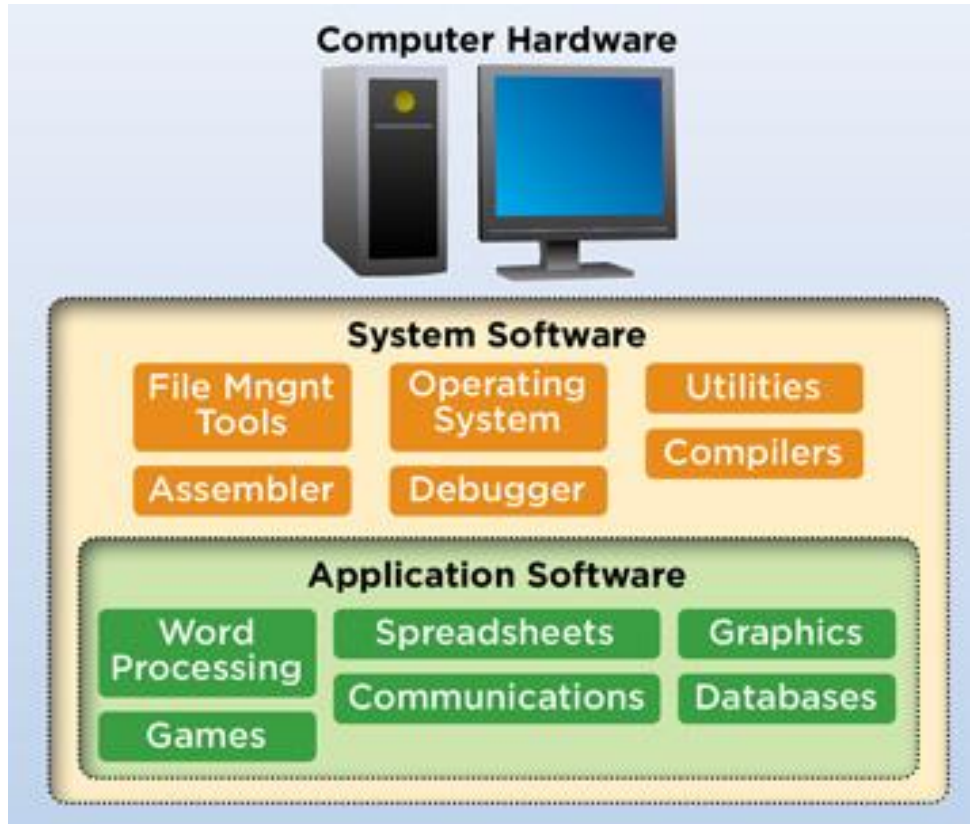


Agenda

1. Categories
 - 1.1. General categories of application software
 - 1.2. Software categories by function
 - 1.3. Specific types of application software: simulation and other applications
2. Application software forms
3. Cloud based technology defined
4. On-premise vs cloud computing
5. SaaS, PaaS, IaaS
6. Cloud technology impact and challenges

Give definition for “software”

Where does **application** software fit in?



Definition

Application software consists of programs designed to make users **more productive** and/or assist them with **personal tasks**.

Application software has a variety of uses:

- To make business activities more efficient
- To assist with graphics and multimedia projects
- To support home, personal, and educational tasks
- To facilitate communications

General categorization (dated)

CATEGORIES OF APPLICATION SOFTWARE

APPLICATION SOFTWARE	1	2	3
	Business	Graphics and Multimedia	Home/Personal/Educational
	<ul style="list-style-type: none"> • Word Processing • Spreadsheet • Database • Presentation Graphics • Note Taking • Personal Information Manager (PIM) • PDA Business Software • Software Suite (e.g., word processing, spreadsheet, presentation graphics, PIM) • Project Management • Accounting • Document Management • Enterprise Computing Software 	<ul style="list-style-type: none"> • Computer-Aided Design (CAD) • Desktop Publishing (for the Professional) • Paint/Image Editing (for the Professional) • Photo Editing (for the Professional) • Video and Audio Editing (for the Professional) • Multimedia Authoring • Web Page Authoring 	<ul style="list-style-type: none"> • Software Suite (for Personal Use) (e.g., word processing, spreadsheet, database) • Personal Finance • Legal • Tax Preparation • Desktop Publishing (for Personal Use) • Paint/Image Editing (for Personal Use) • Photo Editing • Clip Art/Image Gallery • Video and Audio Editing (for Personal Use) • Home Design/Landscaping • Reference • Educational • Entertainment
	4		
	Communications		
	<ul style="list-style-type: none"> • E-Mail • Internet Telephony 	<ul style="list-style-type: none"> • FTP • Newsgroup/Message Board 	<ul style="list-style-type: none"> • Web Browser • Chat Room • Video Conferencing • Instant Messaging • Blogging
	Popular Utility Programs		
	<ul style="list-style-type: none"> • Antivirus • File Compression 	<ul style="list-style-type: none"> • Personal Firewall • Backup 	<ul style="list-style-type: none"> • Spyware Remover • CD/DVD Burning • Internet Filters • Media Player • File Manager • Personal Computer Maintenance

FIGURE 3-1 The four major categories of popular application software are outlined in this table. Communications software often is bundled with other application or system software. Also identified in the table are widely used utility programs.

More updated alternative categorization

https://www.g2.com/categories?category_type=software

Closer look: development category tools

Integrated Development Environment (IDE)

Bug Tracking

Version control systems

Testing tools

...

Integrated Development Environment (IDE)

- ▶ Software platforms that provide developers a comprehensive set of tools for software development in a single product.
- ▶ Commonly include
 - ▶ text or code editors
 - ▶ a debugger
 - ▶ a compiler
 - ▶ build automation tools
 - ▶ Graphical User Interface builder
 - ▶ code completion features that intelligently complete code automatically.
- ▶ Can be both specific to a single programming language or offer multi-language support
- ▶ Can offer a variety of plugins to add support for other languages, programming frameworks, and version control platforms



Visual Studio
★★★★★
161 reviews



IntelliJ IDEA
★★★★★
135 reviews



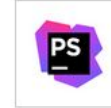
Eclipse
★★★★★
120 reviews



Xcode
★★★★★
98 reviews







NetBeans
★★★★★
63 reviews



PHPStorm
★★★★★
52 reviews

Bug tracking software

- ▶ Software used by quality assurance (QA) and software development teams to report software bugs and problems.
 - ▶ supports the creation of multiple projects
 - ▶ files bugs/tickets in a specific project
 - ▶ allows commenting, file uploading, and custom fields to track the history of a bug
 - ▶ provides severity and/or priority for bugs
 - ▶ provides reports by project or user
- ▶ Video on [Jira](https://www.youtube.com/watch?v=PQa3NFB_LRg&t=3s)
 - ▶ https://www.youtube.com/watch?v=PQa3NFB_LRg&t=3s

	JIRA ★★★★☆ 815 reviews <input type="checkbox"/> ADD TO COMPARE
	Bugzilla ★★★★☆ 51 reviews <input type="checkbox"/> ADD TO COMPARE
	TestTrack ★★★★☆ 50 reviews <input type="checkbox"/> ADD TO COMPARE
	HPE ALM ★★★★☆ 49 reviews <input type="checkbox"/> ADD TO COMPARE

Version control systems

- ▶ Used to track changes to software development projects, and allow team members to change and collaborate on the same files.
- ▶ Allow developers to automatically **track** their work, **see a history** of all changes, and **revert** to previous versions of a project when needed



Git

★★★★★ 106 reviews

☐ ADD TO COMPARE



Microsoft Team Foundation ...

★★★★★ 46 reviews

☐ ADD TO COMPARE



Subversion

★★★★★ 38 reviews

☐ ADD TO COMPARE

Testing tools

Software testing software gives development teams the methods and tools to determine the quality of their software creation and improvement projects. Development teams use software testing tools to assess whether software is usable, performs properly, meets development team goals, and meets overall requirements

Test management tools help development teams manage, track, and maintain their software tests.

Software can come in variety of forms

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- is mass-produced, copyrighted retail software
 - meets the needs of a wide variety of users, not just a single user or company.
 - available in retail stores or on the Web.
 - Ex: Word processing, Visual Studio

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- performs functions specific to a business or industry.
 - meets company's unique requirements.
 - programmers to develop tailor-made custom software
 - Ex: WIUT SRS system

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- has been donated for public use and has no copyright restrictions.
 - Anyone can copy or distribute software to others at no cost.

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- is copyrighted software that is distributed at no cost for a trial period.
 - To use a program beyond that period, you send payment to the program developer.

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- is software provided for use, modification, and redistribution.
 - Has no restrictions from the copyright holder regarding modification of the software's internal instructions and redistribution of the software.
 - Can be downloaded from the Internet, sometimes at no cost.
 - Ex.: Linux OS

Match form name with definition on the right

- **Packaged software**
 - **Custom software**
 - **Web-based software**
 - **Open source software**
 - **Shareware**
 - **Freeware**
 - **Public-domain software**
- is copyrighted software provided at no cost to a user by an individual or a company that retains all rights to the software.

Recall the software we used so far

- Google Drive
- Repl.it
- Cmd
- InvisionStudio

Which of them can you use offline?

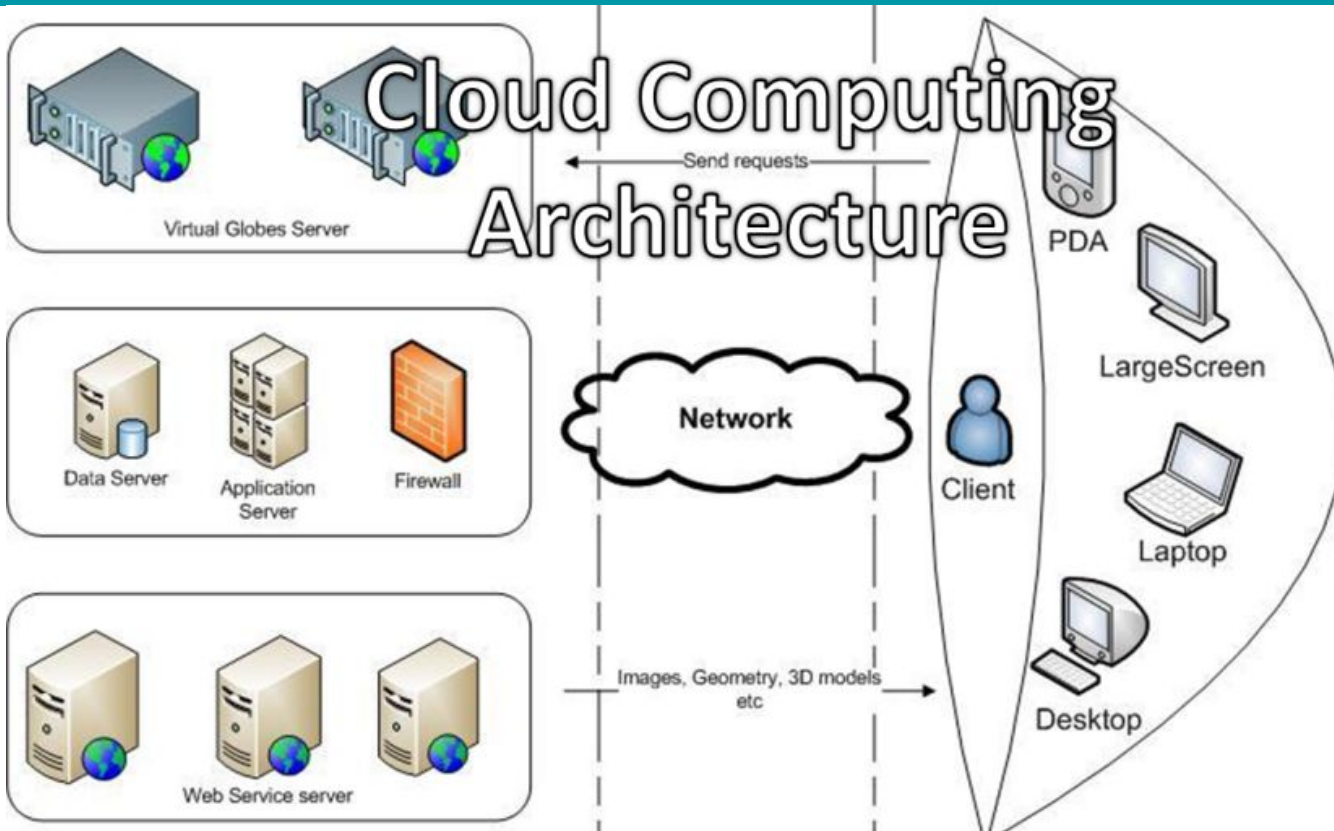
Which of them you normally use online?

Which of them you think may be examples of cloud solutions?

Cloud technology definition

Cloud computing is
the delivery of **on-demand** computing services
over the internet
on a pay as you go basis

Cloud computing architecture



On-premise VS Cloud technology

On premise

VS

Cloud technology

1. Higher pay, less scalability
2. A lot of physical space for servers
3. Team needed to maintain hardware and software
4. Poor data security
5. Less chance for data recovery

1. Pay for what you use
 - a. Scale up => Pay more
 - b. Scale down => Pay less
2. No physical space for servers
3. No team is required (provider manages them)
4. Better data security
5. Disaster recovery

On premise

VS

Cloud technology

- 6. Lack of flexibility (e.g. restructure to meet new business needs)
- 7. No automatic updates
- 8. Less collaboration
- 9. Takes longer time to setup

- 6. High flexibility
- 7. Automatic software updates
- 8. Easier to collaborate due to availability of various tools
- 9. Rapid implementation

Types of cloud computing

Types of cloud computing

By deployment model

- Public cloud
- Hybrid cloud
- Private cloud

By service model

- IaaS
- PaaS
- SaaS

Types of cloud computing: **by deployment model**

Public Cloud

Public Cloud infrastructure is owned by a **third party cloud service provider or CSP** who makes cloud services available to the general public.

In Public Cloud, customers need to **pay only for the resources they use**. This gives them the flexibility to increase or decrease the resources to meet the market demand.

Examples: email, social networking sites, and so on.

Private Cloud

Private Cloud infrastructure is dedicatedly operated for a particular organization, managed by the organization themselves or a third party.

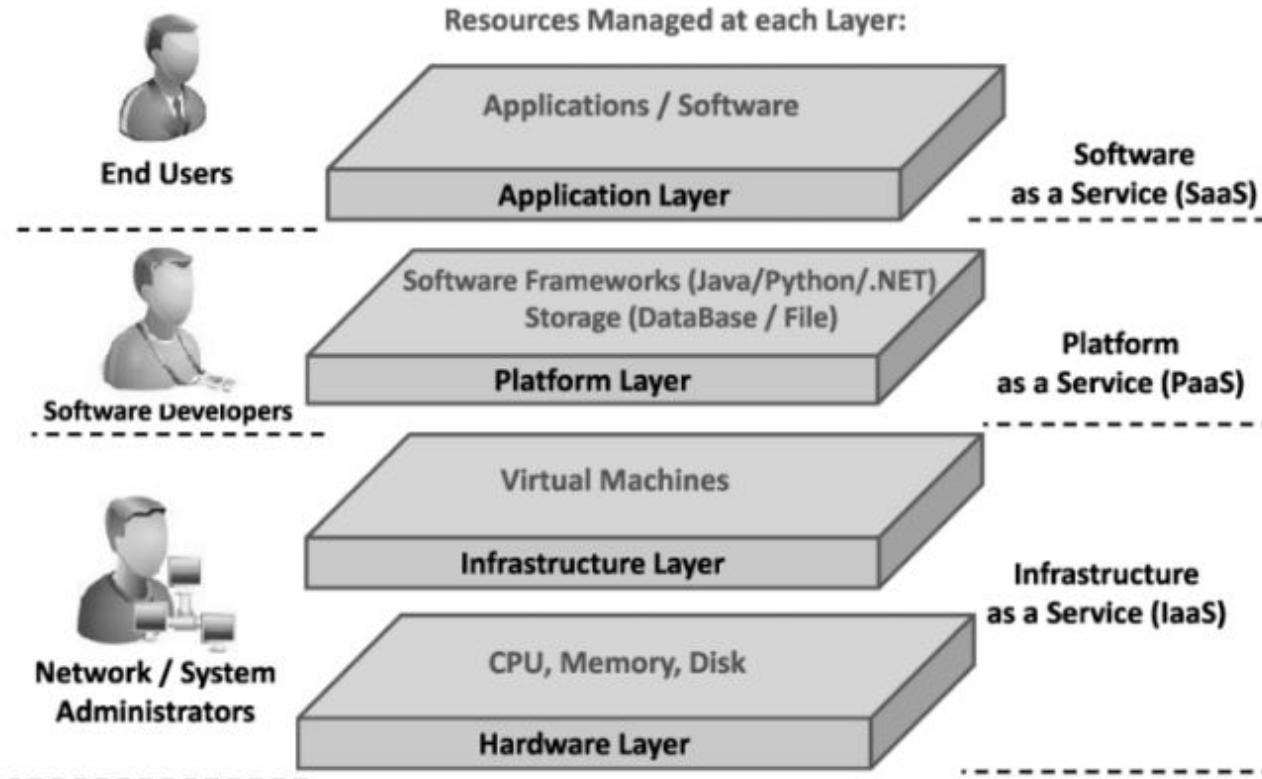
This cloud deployment model is popular among enterprises as customers have complete control over security aspects.

Hybrid Cloud

Hybrid Cloud is the composition of two or more clouds, for example, a combination of private, public clouds.

Types of cloud computing: **by service model**

Application vs Platform vs Infrastructure



Cloud services by service model



SAAS

Software
as a Service

Email
CRM
Collaborative
ERP

CONSUME



PAAS

Platform
as a Service

Application Development
Decision Support
Web
Streaming

BUILD ON IT



IAAS

Infrastructure
as a Service

Caching
Legacy File
Networking Technical
Security System Mgmt

MIGRATE TO IT

Software as a Service (SaaS)

SaaS, a provider offers an entire application stack. Users simply log in and use the application that runs completely on the provider's infrastructure.

The service runs on Cloud and serves multiple end users.

Users: you as end users (e.g. students use trello, google drive for working on cw)

Platform as a Service (PaaS)

Cloud computing model that provides users with hosted development kits, database tools, and application management capabilities.

Using this model, the customer can build applications and deliver it to other users through Internet and servers.

E.g.

- outsource hosting
- database construction
- cloud security capabilities
- data storage

Users: Software developers

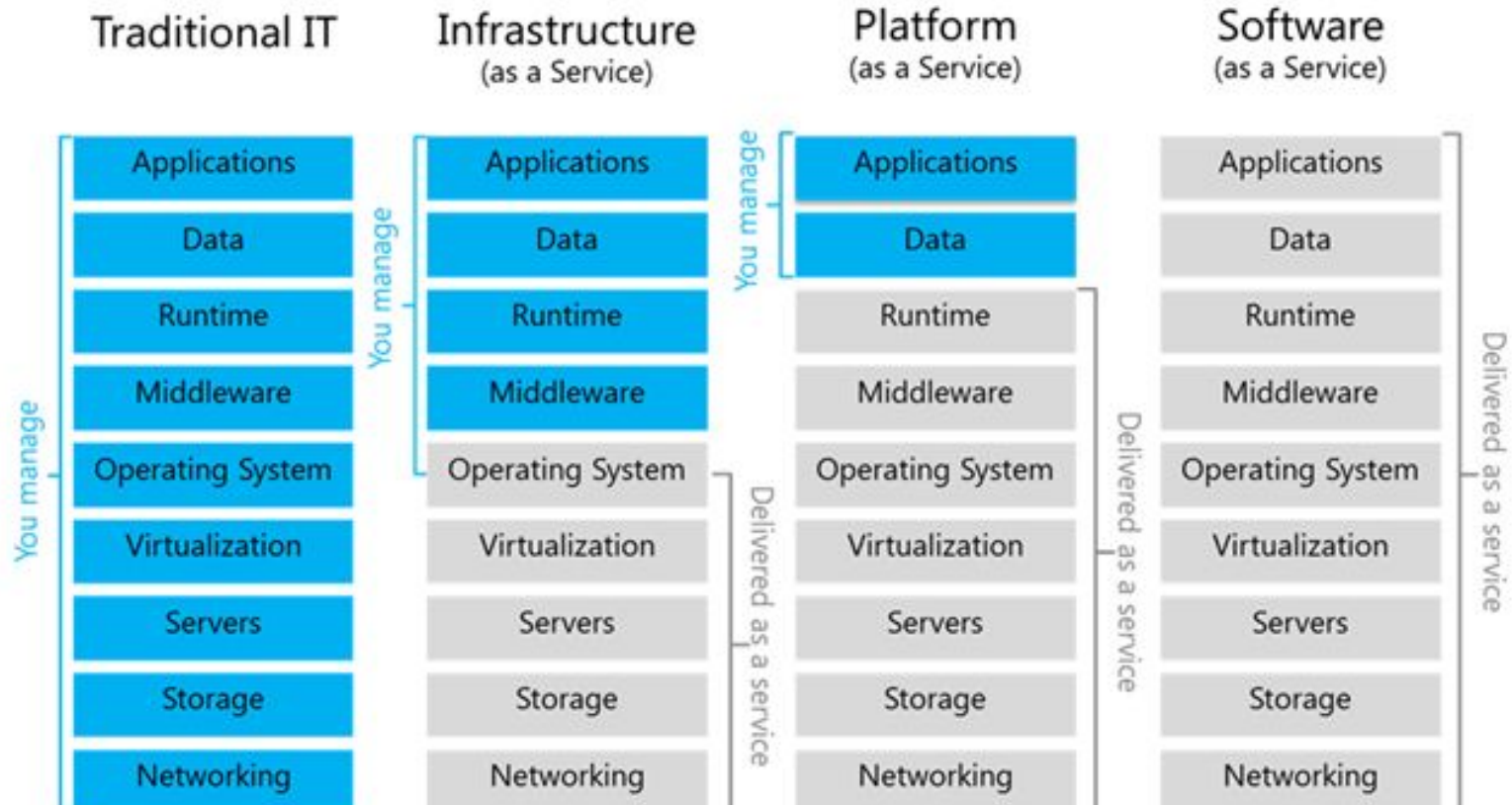
Infrastructure as a Service (IaaS)

In IaaS, a provider supplies the basic compute, storage and networking infrastructure along with the hypervisor (the virtual server platform).

Users must then create virtual machines, install operating systems, support applications and data, and handle all of the configuration and management associated with those tasks.

Users: **IT administrators**

IaaS vs PaaS vs SaaS



Cloud technology impact and challenges

Impact of Cloud Computing on Business

Cost effective

Moving to Cloud Computing reduces the cost of managing and maintaining IT systems. Since the infrastructure need not be purchased, the initial and recurring expenses are lower than traditional computing.

Flexibility

Cloud Computing offers unlimited storage capacity, therefore storage needs can be scaled up or down according to the situation.

Business continuity

Protecting data is important for business continuity. In case of crisis, Cloud Computing helps to quickly access data without loss of productivity.

Efficient collaboration

Collaboration in Cloud gives the business ability to communicate and share information more quickly and easily than through traditional methods

Cloud Computing: challenges

Data Security

In the cloud, data management is provided by a third party and data is stored in remote locations that are not disclosed to the enterprise. This is of concern to the enterprise.

Although Cloud Computing vendors provide accounts with secure passwords, any security breach that may be deliberate or accidental can lead to the loss of business and clients.

Performance and Bandwidth:

Cloud Computing requires high-end servers for providing high-speed Internet and constant connectivity to avoid peak time breakdowns.

Availability:

Availability is also a challenge of Cloud Computing. Some cloud providers lack round-the-clock service. This results in frequent outages.

Regulatory Restrictions:

Governments in some countries do not allow the customer's personal information to be physically located outside their countries. This is further complicated by the fact that some data transit can be regulated in these countries.

Q&A

Who installed python?

Who installed pyCharm?

Who installed git?

Homework and sources

Downey, A. (2015). Think Python: How to think like a computer scientist. Green Tea Press. Ch1, 2, 3, available on intranet

Dale, Computer Science Illuminated, Ch 12

[Watch Cloud computing tutorial from Simplicity on intranet](#)

<https://www.computenext.com/blog/when-to-use-saas-paas-and-iaas/>

<http://blog.webspecia.com/cloud/iaas-paas-saas-explained-examples-comparison>

<https://dachou.github.io/2018/09/28/cloud-service-models.html>