Platform as a Service (PaaS)

Prof. Tahar Kechadi

School of Computer Science

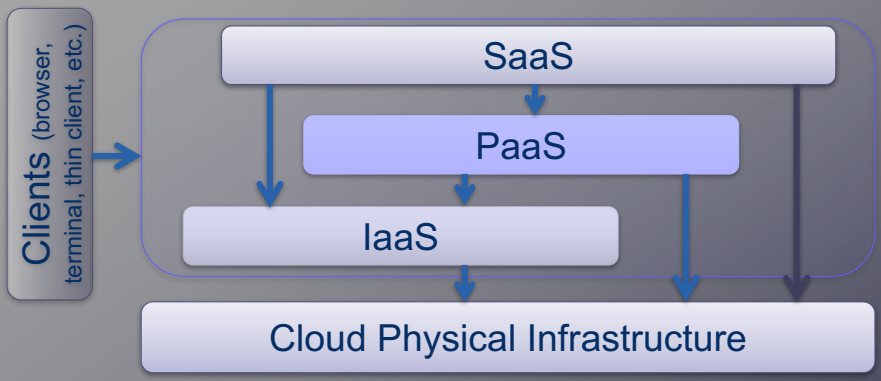
1

Learning Outcomes

- Define the PaaS model
- Describe the advantages and disadvantages of PaaS
- Case Studies:
  - List some real-world PaaS solutions

2

Keep the hierarchy in mind!



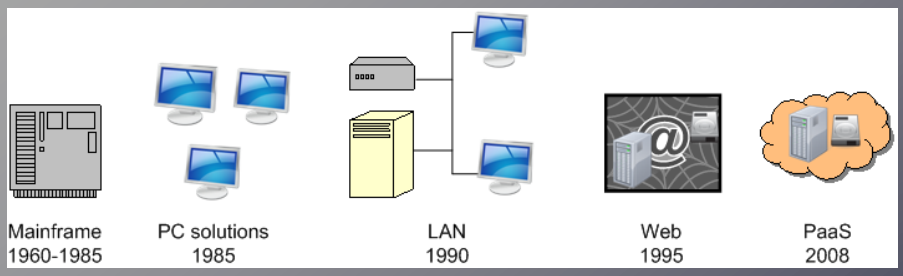
3

PaaS Model

- PaaS Model
  - Provides a collection of hardware and software resources required to build and deploy applications and services within the cloud
  - Avoids the complexity of buying and maintaining different tools for developing an application
- PaaS services
  - Change the way the software is developed and deployed
  - Users can use language runtimes, application frameworks, DBs,, message queues, testing tools, and deployment tools as a service over the Internet

4

Evolution of technology



Typical PaaS
- Programming languages: Java, Perl, PHD, Python, Ruby, Scala, …
- Application frameworks: Node.js, Rails, Drupal, WordPress, Spring, …
- Databases: ClearDB, PostgreSQL, Cloudant, MongoDB, Redis, …
- Testing tools: …

5

From ISP to PaaS

- Internet Services Providers
  - Maintained webservers and high-speed, high-bandwidth connections
  - Reduced cost
  - Less: server administration, hardware to purchase and maintain
  - Greater system uptime
  - Potential scalability
- Used Windows-, Linux-based webservers
  - Laid the groundwork for the eventual creation-cloud-based PaaS solutions

6

Abstraction from IaaS

- Layered system
  - The Infrastructure layer provides users with direct access to the underlying infrastructure
- Isolation
  - Isolate users from the resource interaction to the lower levels of resource interaction
  - Allow developers to create new software that is not susceptible to the number of provisioned machines or their network configuration

7

API to support SaaS

- Software Development
  - PaaS allows developers to build new software that takes advantage of the available resources
- PaaS APIs
  - Solution is usually designed with a set of APIs that directly influence the programs that can be built on the Cloud
- Vendor Dependent
  - PaaS solutions are deeply tied to Cloud vendors

8

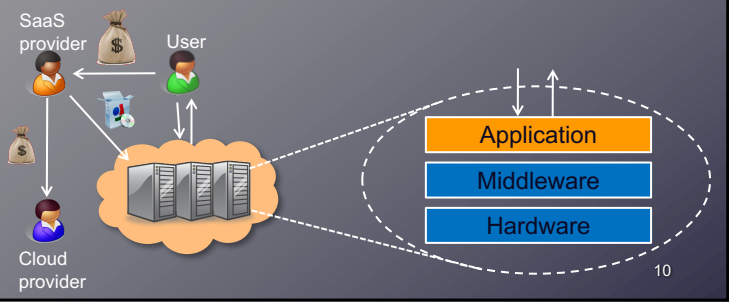
PaaS Examples

- Add-ons to SaaS
  - PaaS model can support add-ons to SaaS applications, stand-alone environments for general development, and application delivery-only environments, supporting hosting
- Examples
  - Google App Engine
  - Microsoft's Azure
  - VMware's Cloud Foundry
  - And many others…

9

PaaS and SaaS

- Cloud provides middleware/infrastructure
  - For example, Microsoft Common Language Runtime (CLR)
  - Customer pays SaaS provider for the service; SaaS provider pays the cloud for the infrastructure



10

PaaS Advantages

- Lower total cost of ownership
  - No need to purchase and maintain expensive hardware…
- Lower administrative overhead
  - Shift the burden of system software administration from in-house to the cloud provider
- More current system software
  - Cloud provider is responsible for maintaining software versions and patches.
- Increased business and IT alignment
  - Company IT can focus on solutions rather than server-related issues
- Scalable solutions
  - Cloud-based solutions can scale-up and down dynamically based on the demand.

11

PaaS Benefits for Developers

- Focus shift
  - Focus only on innovations that provide real business value instead of infrastructure setup
- Infrastructure
  - Zero infrastructure
- Risk
  - Lower Risk
- Cost
  - Lower cost
- Ease of use
  - Easy and quick development
- Reusable code
- …

12

PaaS Disadvantages

- Security
  - Concern about data security
- Portability
  - Challenges to integrating cloud solutions with legacy software
- Trust
  - Risk of breach by the PaaS provider

13

Example: Google App Engine (GAE)

- GAE
  - Let developers to create and host web-based applications that reside and run on services managed by Google
- GAE Features
  - Support Java, Python, Go, …
  - Support for dynamic web pages
  - Data storage and query support
  - Load balancing for application scalability
  - API and SDK
  - Administrative console for managing applications and databases

14