4Th Year

Web Services and Security

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Introduction to Web Services

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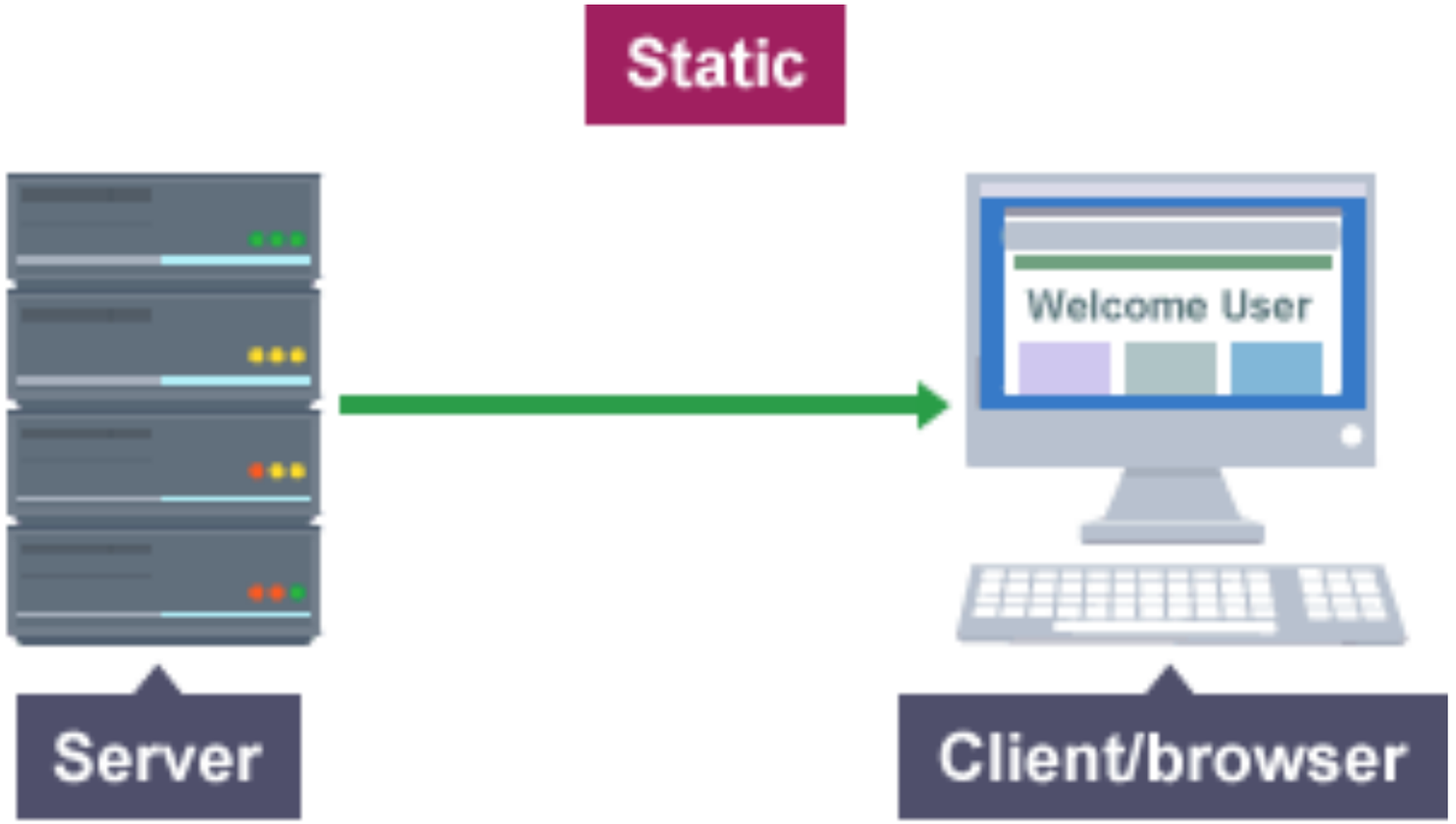
In the early days of the internet



Content Management of a Website is important

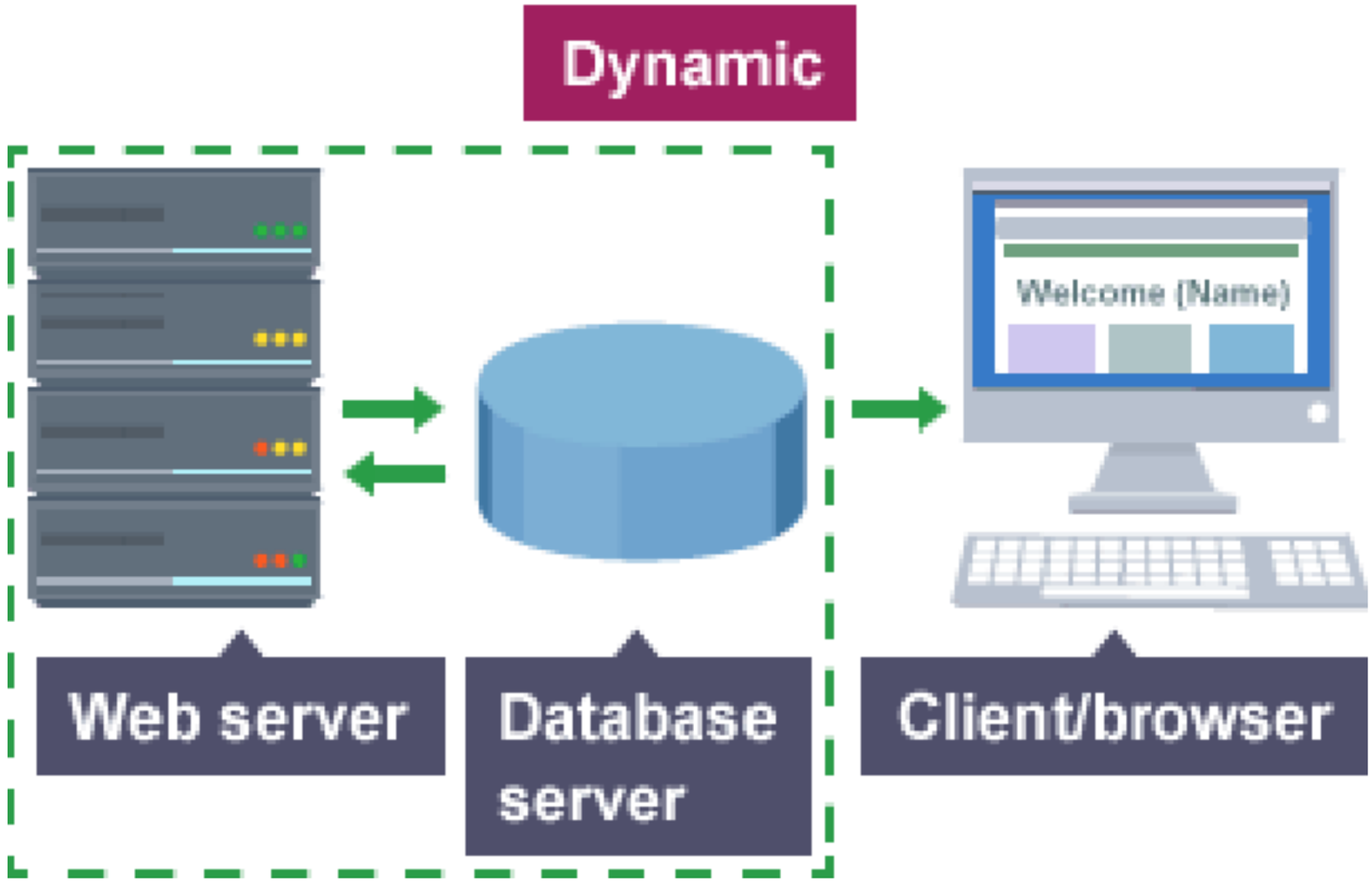
Static content quickly become outdated.

Introduction to Web Services

Cont….

- **2-tier web applications were realized with the introduction of the Common Gateway Interface (CGI)**

  - **CGI** retrieves contents from external data resource, such as a database.
  - **A CGI** script processes the request and returns the result to the web server.
  - **The Server** formats the contents in HTML and returns to the browser for display.



Cont….

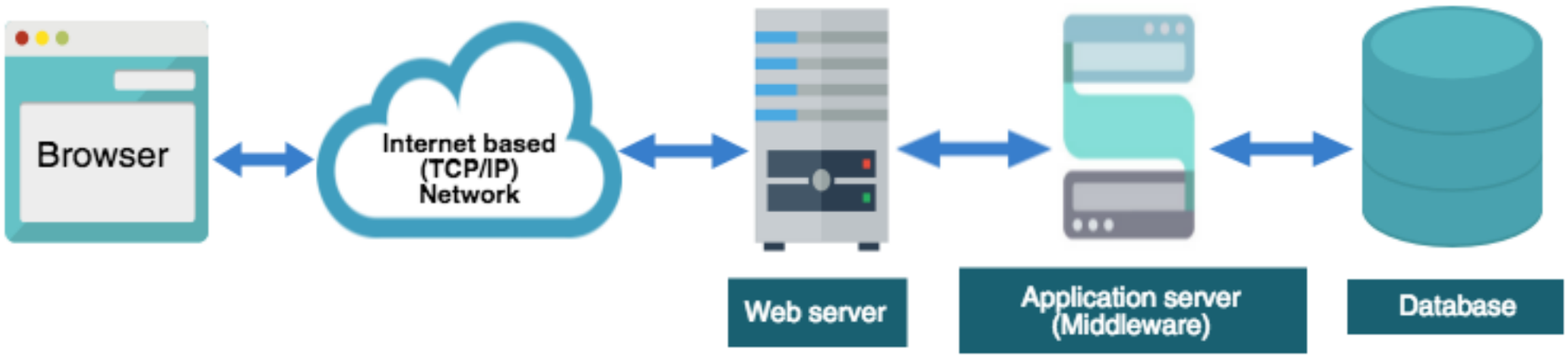
CGI suffered many drawbacks:

- The database was often running on the same machine, Therefore, making backup of the data was difficult.
- CGI was running as a separate process, so it suffered from a context-switching penalty.
- CGI was not designed for performance, security or scalability.

Introduction to Web Services

Cont….

Nowadays, n-tier web application architecture is commonly used.



- **Middleware** introduced to connect the web server and the database more efficiently.

- The performance of an n-tier application is improved because web servers, middleware and databases can be hosted by separate machine.

Introduction to Web Services

Cont….

In the early days integration of the applications is a problem

Because:

- Language Barriers
- Platform Barriers
- Network Barriers

Cont….

Nowadays, Solution

Web Services

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Introduction to Web Services

Cont….

What is Web Services?

Introduction to Web Services

Cont….

What is Web Services?

- A **web service** is any piece of software that makes itself available over the internet and uses a standardized XML messaging system.
- XML is used to encode all communications to a web service.
- A client invokes a web service by sending an XML message, then waits for a corresponding XML response.

Java can talk with perl

Windows Application can talk with Unix Application

Cont….

What is Web Services?

- Web services are XML-based information exchange systems that use the Internet for direct application-to-application interaction. These systems can include programs, objects, messages, or documents.

Introduction to Web Services

Cont….

What is Web Services?

- **A web service is a collection of open protocols and standards used for exchanging data between applications or systems.**

- Software applications written in various programming languages and running on various platforms can use web services to exchange data over the internet.

- **Interoperability (e.g., between Java and Python, or Windows and Linux applications) is due to the use of open standards.**

Cont….

What is Web Services?

- A complete web service is, therefore, any service that:
  - Is available over the Internet or private (intranet) networks.
  - Uses a standardized XML messaging system.
  - Is not tied to any operating system or programming language.
  - Is a self-describing via a common XML grammar.
  - Is discoverable via a simple find mechanism.

Cont….

Components of Web Services

- The basic web services platform is XML + HTTP
- **All the standard web services work using the following components:**

  - **SOAP (Simple Object Access Protocol).**
  - **UDDI (Universal Description, Discovery and Integration).**
  - **WSDL (Web Services Description Language).**

Cont….

Why Web Services?

- **Exposing the Existing Function on the network**

  - A web service is a unit of managed code that can be remotely invoked using HTTP, that is, it can be activated using HTTP requests.

  - Web services allows you to expose the functionality of your existing code over the network.

  - Once it is exposed on the network, other application can use the functionality of your program.

Cont….

Why Web Services?

- **Interoperability**

  - Web services allow various applications to talk to each other and share data and services among themselves.

  - Web services are used to make the application platform and technology independent.

Cont….

Why Web Services?

- Standardized Protocol

- Web services use standardized industry standard protocol for the communication.

- All the four layers (Service Transport, XML Messaging, Service Description, and Service Discovery layers) use well-defined protocols in the web services protocol stack.

Why Web Services?

- **Low Cost of Communication**

  - Web services use SOAP over HTTP protocol, so you can use your existing low-cost internet for implementing web services.

  - This solution is much less costly compared to proprietary solutions like B2B.

  - Besides SOAP over HTTP, web services can also be implemented on other reliable transport mechanisms like FTP.

Cont….

Web Services Characteristics

- XML-Based

- Web Services uses XML at data representation and data transportation layers.
- Using XML eliminates any networking, operating system, or platform binding.
- Web Services based applications are highly interoperable application at their core level.

Cont….

Web Services Characteristics

- Loosely Coupled

- A consumer of a web service is not tied to that web service directly. The web service interface can change over time without compromising the client's ability to interact with the service.

Cont….

Web Services Characteristics

- Ability to be Synchronous or Asynchronous

- Synchronicity refers to the binding of the client to the execution of the service.
- In synchronous invocations, the client blocks and waits for the service to complete its operation before continuing.
- Asynchronous operations allow a client to invoke a service and then execute other functions.
- Asynchronous clients retrieve their result at a later point in time, while synchronous clients receive their result when the service has completed.

Web Services Characteristics

- Supports Remote Procedure Calls(RPCs)

- Web services allow clients to invoke procedures, functions, and methods on remote objects using an XML-based protocol.

- Remote procedures expose input and output parameters that a web service must support.

- Enterprise JavaBeans (EJBs) and .NET, Both technologies are distributed and accessible through the variety of RPC mechanism.

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Web Services Characteristics

- Supports Document Exchange

- One of the key advantages of XML is its generic way of representing not only data, but also complex documents.

- Web services support the transparent exchange of documents to facilitate business integration.

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