**Web Services**

- A web service allows different systems to talk to each other over the internet. Web services are open standard (XML, SOAP, HTTP, etc.) based web applications that interact with other web applications for the purpose of exchanging data. Web services can convert your existing applications into web applications.

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Benefits of WS:  
 reusability, interoperability, usability, and deployability.

Considerations of web services

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common web service security principles:

Authentication and Authorization

Authentication: validates identity of client

Authorization: determines level of client’s access

**Web services, APIs, and microservices**

APIs are the communication and data sharing mechanism between two different applications or systems.  
APIs are a natural evolution of web services.  
APIs are more dynamic.

all web services are APIs, but not all APIs are web services

APIs have a more lightweight architecture and are good for devices with limited bandwidth.

Web services are often dependent on the SOAP protocol to send and receive data over a network, which isn't a lightweight architecture.

Microservices are fully contained, individual components that communicate with each other in calling clients.

Microservices is an approach to building an application that breaks its functionality into modular components. APIs are part of an application that communicates with other applications. So, APIs can be used to enable microservices.

RESTful API

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API Principles:

  
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Benefits of REST APIs:

- easier to create and easier for clients to consume.  
 - They're frequently used for web integration and mobile device applications.  
 - promote loose coupling.  
 - Unlike other styles, RESTful APIs allow for a greater variety of data formats. XML or JSON or something else entirely.

All REST APIs must have the HATEOAS principle to be genuine.

- Hypermedia As The Engine Of Application State

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SAOP (Simple Object Access Protocol)

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So why still use SOAP even though REST is better

Like in PayPal

SOAP is preferred for high security and/or complex transactions.

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GraphQL  
 is a query language for APIs and a runtime for fulfilling those queries with your existing data.

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Graphical user interface, text, application

Description automatically generated

Graphical user interface, text, application, chat or text message

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Schema: defines a set of types  
Queries: allow you to get information about specific fields from objects  
Resolvers: responsible for getting the data for us.

Unlike regular SOAP or REST APIs, GraphQL gives you the ultimate flexibility in being able to specify in your API requests specifically what data you need and get back exactly that.