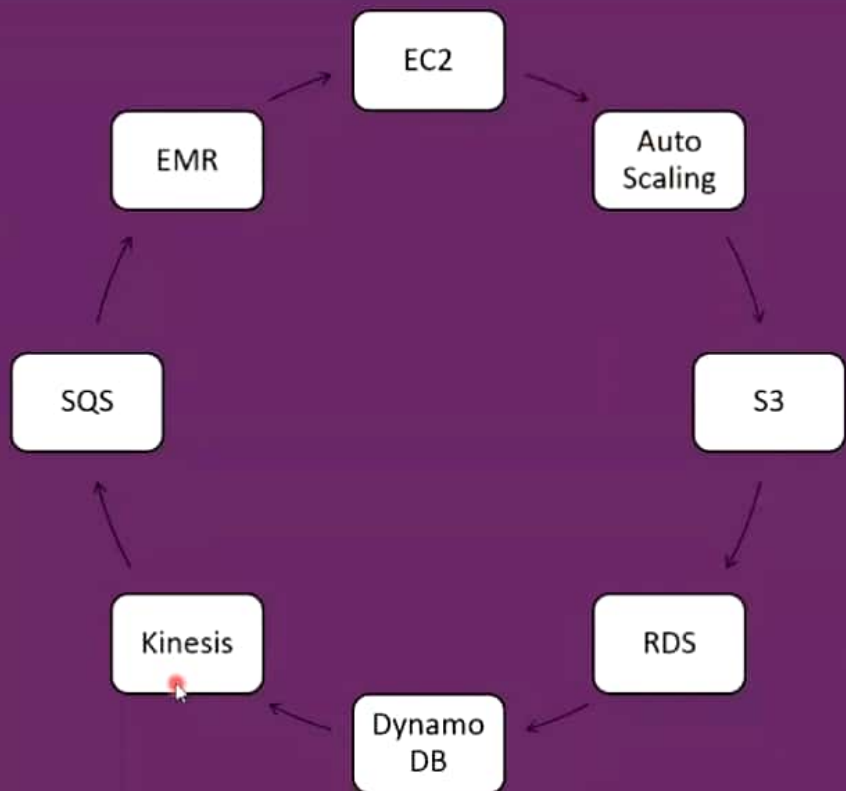Amazon Web Services (AWS) for IoT

Amazon EC2

- An IaaS provided by Amazon
- EC2 delivers scalable, pay-as-you-go compute capacity in the cloud
- Web service that provides computing capacity in the form of virtual machine
- EC2 can be used for several purposes for IOT systems
- For example, IOT developers can deploy IOT applications on EC2, setup IOT platforms with REST web services, etc.

Amazon AutoScaling

- Allows automatically scaling EC2 capacity up or down according to the user defined condition

- Users can increase number of EC2 instances

- AutoScaling can be used for auto scaling IOT applications and IOT platforms deployed as Amazon EC2.

Amazon S3

- Online cloud based data storage infrastructure for storing and retrieving large amount of data

- Offers reliable, scalable, fast, fully redundant and affordable storage infrastructure

- Serve as raw datastore for IOT systems for storing raw data such as sensor data, log data, image, audio, video, etc.

Amazon RDS

- Web service that allows to create instances of MySQL, Oracle or MS SQL Server in cloud

- Developers can easily set up, operate and scale a relational database in cloud

- Serve as a scalable datastore for IOT systems

- With RDS, IOT system developers can store any amount of data in scalable relational databases

Amazon DynamoDB

- Fully-managed, scalable, high performance No-SQL database service
- Serve as scalable datastore for IOT systems
- With DynamoDB, IOT system developers can store any amount of data and serve any level of requests for the data.

Amazon Kinesis

- Fully managed commercial service that allows real-time processing of streaming data

- It scales automatically to handle high volume streaming data coming from large number of sources

- The streaming data collected by kinesis can be processed by applications running on Amazon EC2 instances

- Kinesis is well suited for IoT systems that generate massive skill data and have strict real-time requirements for processing the data.

Amazon SQS

- Amazon SQS offers highly scalable and reliable hosted queue for storing messages as they travel between distinct components of applications

- SQS guarantees only that messages arrive, not that they arrive in the same order in which they were put in the queue

- SQS can be used in distributed IOT applications in which various application components need to exchange messages

Amazon EMR

- Amazon EMR is a web service that utilizes Hadoop Framework running on Amazon EC2 and Amazon S3

- EMR are allowed processing of massive scale data hence suitable for IOT applications that generate large volume of data that needs to be analyzed

- Data processing jobs are formulated with the MapReduce parallel data processing model.

Sky Net IoT Messaging Platform

- Open source instant messaging platform

- Sky Net API supports both HTTP REST and real-time WebSockets

- Sky Net allows you to register devices (or nodes) on the network

- A device can be anything including sensors, smart home devices, cloud resources, drones

- Each device has an UUID & secret token

- Devices or client applications can subscribe to other devices and receive/send messages.

WAMP-AutoBahn for IoT

- Web Application Messaging Protocol
- Sub-protocol of Web socket which provides
  - Publish-Subscribe and
  - Remote Procedure Call (RPC) messaging patterns
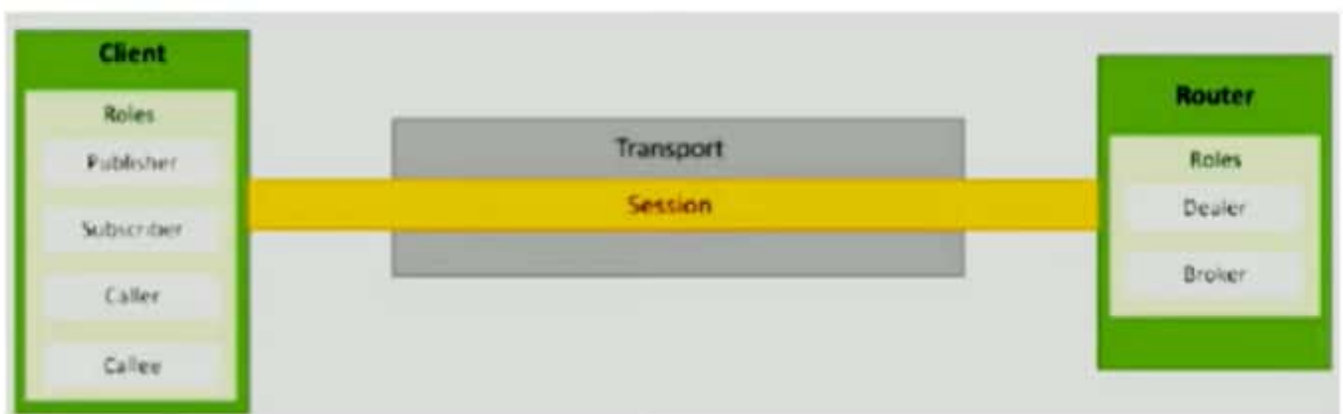
WAMP-AutoBahn for IoT

- Transport: Channel that connects two peers
- Session: Conversation between two peers that runs over a transport
- Client: Peers that can have one or more roles
- In publish-subscribe model client can be:
  - Publisher: Publisher publishes events (including payload) to the topic maintained by the Broker
  - Subscriber: Subscriber subscribes to the topics and receives the events including the payload

WAMP-AutoBahn for IoT

- In RPC model client can be:
  - Caller: Issues calls to the remote procedures along with call arguments
  - Callee: Executes the procedures to which the calls are issued by the caller and returns the results back to the caller
- Router: Routers are peers that perform generic call and event routing

WAMP-AutoBahn for IoT

- In publish-subscribe model Router has role of Broker, acts as router and routes messages published to topic to all subscribers subscribed to the topic

- In RPC model Router has the role of a Broker:
  - Dealer: acts as router, routes RPC calls from Caller to Callee & routes results from Callee to Caller

- Application Code: Application code runs on the Clients (Publisher, Subscriber, Callee or Caller)

Python Web Application Framework - Django

- Django is an Open source web application framework for developing web applications in Python

- A web application framework is a collection of solutions, packages and best practices that allows development of web applications and dynamic websites

- Django is based on Model-Template-View architecture and provides separation of data model from business rules and user interface

- It provides unified API to a database backend

- Thus web applications built with Django can work with different databases without requiring any code changes

Python Web Application Framework - Django

- With this flexibility in web application design combined with the powerful capabilities of the Python language and the Python ecosystem, Django is best suited for cloud applications

- Django consists of an object-relational mapper, a web templating system and a regular-expression based URL dispatcher.

Django Architecture

Model

- Acts as definition of stored data and handles interactions with database
- In a web application, data can be stored in a relational database, non-relational database, an XML file, etc.
- Django model is Python class that outlines variables and methods for particular type of data

Template

- In a typical Django web application, the template is simply an HTML page with a few extra placeholders
- Django's template language can be used to create various forms of text files (XML, email, CSS, JavaScript, CSV, etc.)

View

- The view ties the model to the template
- The view is where you write the code that actually generates the web pages

Python Web Application Framework

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