AWS ECS

https://aws.amazon.com/ecs/getting-started/

Create ECS Cluster with 1 Container Instance
From <https://medium.com/boltops/gentle-introduction-to-how-aws-ecs-works-with-example-tutorial-cea3d27ce63d>

Fully managed container orchestration service that helps you deploy, manage and scale containerized applications, do not need to set up or maintain the underlying infra

Containerized applications are software apps that are packaged along w all dependencies, libs and config files into a single unit called container.

Ensures apps run consistently across diff env

COMPONENTS: containers- standalone packages that incl everything needed to run a piece of software

images- read only templates used to create containers, built from a dockerfile - plaintext file w instructions to build a container

After build, they're stored in a registry where they can be downloaded

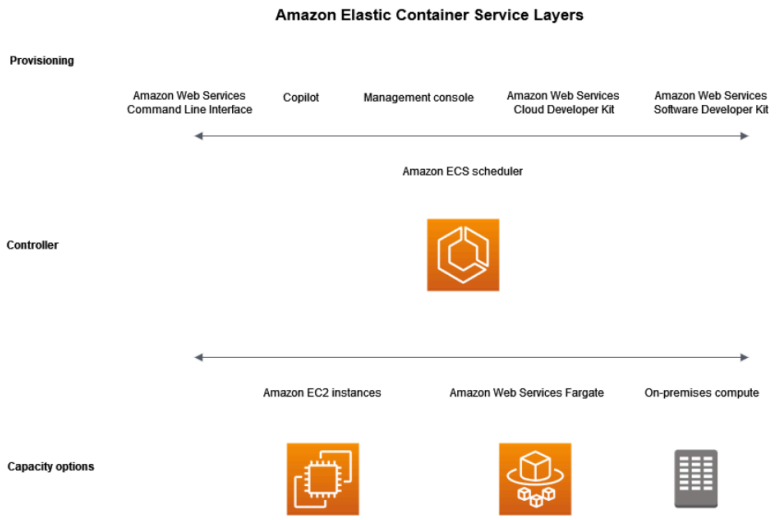
container runtime- software that runs containers eg Docker engine

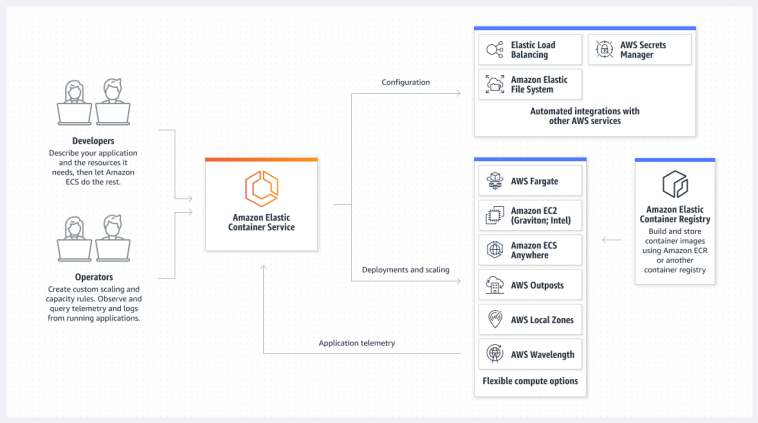
Container orchestration- platforms like AWS ECS

BENEFITS: deployment platform independence, improved security and resource allocation because container runs on its own isolated env, scale up/down based on demand, host system's kernel is shared

Integrated with Amazon Elastic Container Registry and Docker

3 layers:
CAPACITY: infra where containers run
CONTROLLER: deploy and manage apps that run on containers
PROVISIONING: tools to use to interface with scheduler to deploy and manage apps and containers





Scales web apps, supports batch processing and trains NLP and AI/ML model

AWS ECS	AWS EC2
Logical grouping of EC2 machines/instances config used for efficient management of EC2 instance resources	Is a remote/virtual machine

Logical- not a physical entity, it is created and managed by software

Cluster- group of resources where containers run, logical because they do not correspond to individual physical systems

Container- not exactly a VM

Docker- to create container instances, when you install docker on your machine, it becomes a docker host and on this host we create containers(light wt VMs)

ECS clusters EC2 instances and uses Docker to instantiate containers/instances/VMs on Ec2 hosts

Amazon ECS Capacity Options:

EC2 instances in the AWS Cloud

Serverless AWS Fargate compute engine- no need to manage serves, handle capacity planning or isolate container workloads for security, less customisation allowed

VMs or ECS Anywhere

ECS Provisioning Options:

Management Console- web interface

Software Dev Kit- provides lang specific APIs and handles all connection details

Copilot- open source tool for dev to build, release and operate production ready containers

Cloud DK- open source sd framework to model and provision cloud apps

CLI

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Docker- software that facilitates and automates installation and deployment of apps inside Linux containers

A logic group of EC2 instances running as a single app is cluster
Each EC2 in ECS cluster is called container instance

Daemon is a program that runs continuously as a background, is not in direct control of an interactive user

Container agent: runs on each container instance within the ECS cluster.
Sends info about current running tasks and resource util of containers to ECS, starts and stops tasks whenever it receives a request

Launch an ECS

Add EC2 instances - to add you need container agent running on EC2 machine, can be done manually or using AMI
When EC2 instance is launched, agent automatically registers it to default ECS cluster
The agent running on each of these EC2 instance within the ACS cluster sends info about the instance's current running tasks and resource utilisation to ECS

AWS ECS Tasks and Scheduling:

REPLICA: places a desired number of tasks in cluster and maintain this number of tasks, restoring them if some of them fail

DAEMON: places one task on each active container instance that meets the relevant criteria

Advantages of ECS:

Scalability, high availability (and fault tolerance), cost effective, easy integration and security.

ECS features:

1. Scheduling- place containers over clusters acc to desired resources and av req; used to schedule batch jobs and long running apps or services= AWS Blox integrates with ECS to schedule cont
2. Docker Int- EC2 instance in a cluster runs a Docker daemon that deploys and runs any app packages as a container locally on ECS w/o changes
3. Networking- supports Docker Networking and Am VPC to provide isolation for containers, 4 modes:
    1. Host Mode- containers added directly to host's network stack and exposes container on network that are not isolated
    2. Task Networking- assigns every running ECS task a dedicated elastic networking interface which provides containers with full networking features in Amazon VPC
    3. None- deactivates external networking for containers
    4. Bridge- creates a Linux bridge to connect all containers operating on host in local VN and accessed thru host's default network conn
4. Cluster management
5. Task definitions through declarative JSON template, you specify:
    1. Memory req
    2. CPU req
    3. Docker repo and images
    4. Shared data vol
    5. How containers connect to each other
    6. Version control of app specifications
6. Load Balancing
7. Programmatic Ctrl- various APIs
8. Monitoring and Logging

Whenever a new v of application Task Definition is uploaded, ECS scheduler automatically starts new containers using the updated image and disables any container running on old v