

# Creating a CloudFormation Template

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# Overview



Creating a template from scratch

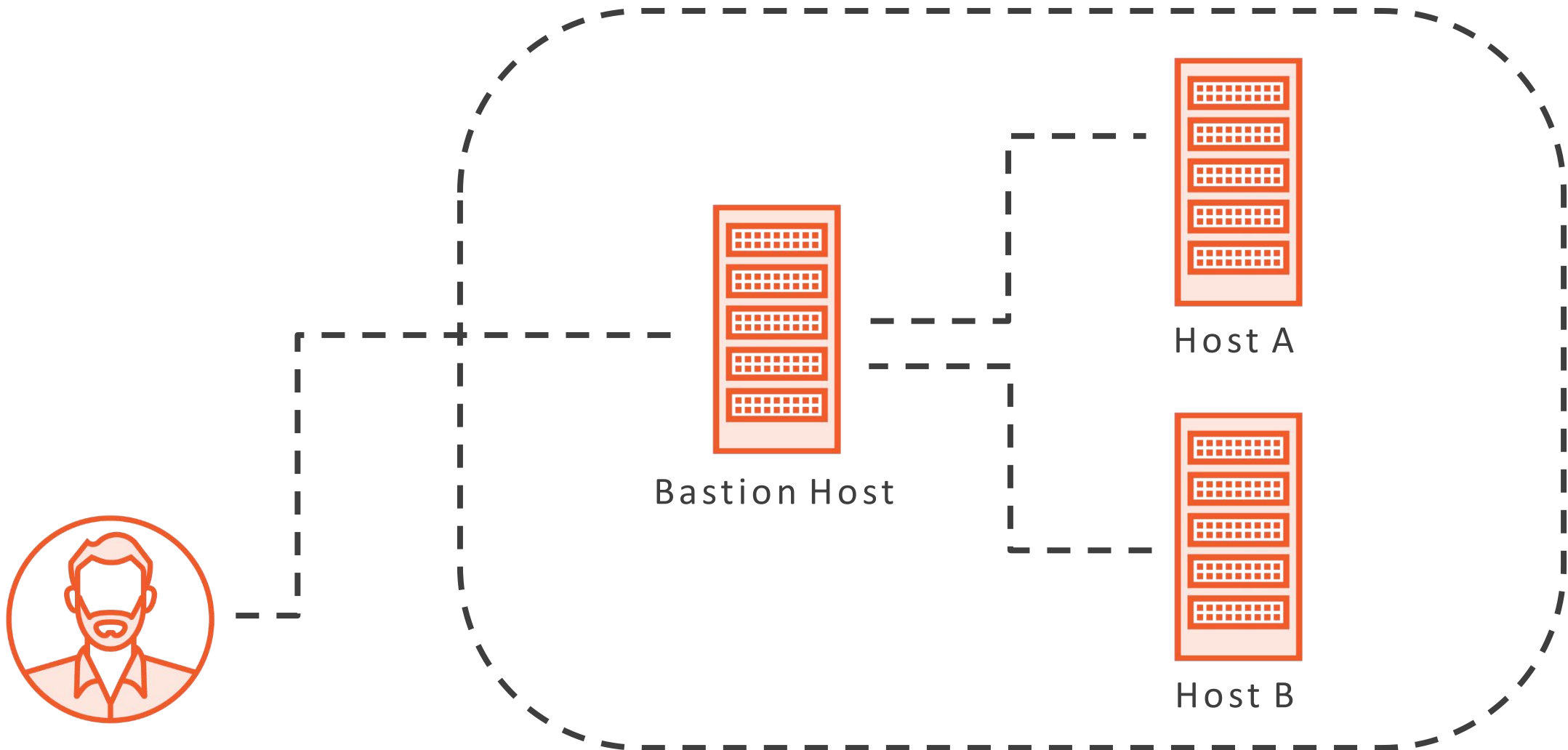
Anatomy of a template

Define target state of your infrastructure

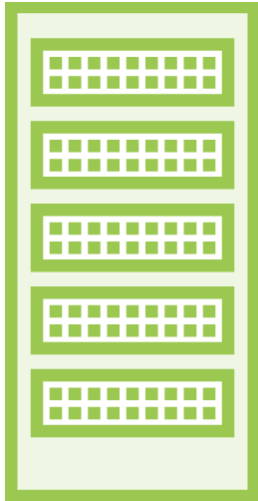
Explore resource types and their properties

Describe dependencies between resources

# SSH Bastion Host



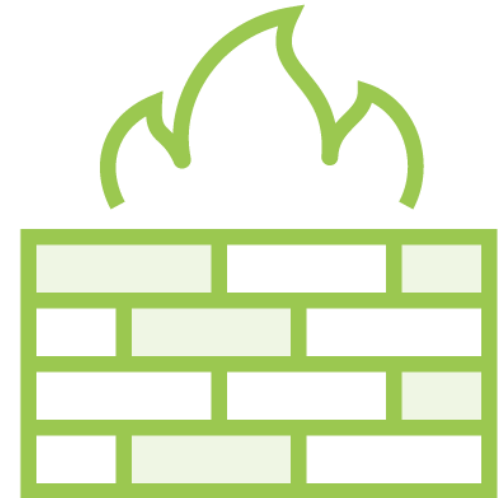
# Needed Parts for Bastion Host



**EC2 Instance**  
Running a SSH server



**Elastic IP**  
Static and public IP  
address linked to EC2  
instance



**Security Group**  
Firewall rules  
controlling incoming  
traffic to EC2 instance

# Anatomy of a CloudFormation Template

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# Minimal Template

```
{  
  "AWSTemplateFormatVersion": "2010-09-09",  
  "Description": "SSH Bastion Host",  
  "Resources": {  
    "EC2Instance": {...},  
    "ElasticIp": {...},  
    "SecurityGroup": {...}  
  }  
}
```

```
{  
  "AWSTemplateFormatVersion": "2010-09-09",  
  "Description": "SSH Bastion Host",  
}
```

## Template Format Version and Description

Version of the template anatomy: only valid value: 2010-09-09

A description helps you to organize and document your template

```
"Resources": {  
    "EC2Instance": {...},  
    "ElasticIp": {...},  
    "SecurityGroup": {...}  
}
```

## Resources Section

Includes the description of your infrastructure

The target state of all involved resources is described here



# Working with Resources

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# Resource Types

(More than 100s)

AWS::EC2::Instance

AWS::EC2::SecurityGroup

AWS::EC2::EIP

AWS::RDS::DBInstance

AWS::IAM::Role

AWS::EC2::VPC

AWS::ElasticCache::CacheCluster

AWS::DynamoDB::Table

...

# Resource Definition

```
{
```

```
...
```

```
"Resources": {
```

```
  "EC2Instance": {
```

```
    "Type": "AWS::EC2::Instance",
```

```
    "Properties": {...}
```

```
  }
```

```
}
```

```
}
```

# Resource Definition

```
{
```

```
...
```

```
"Resources": {
```

```
  "EC2Instance": {
```

```
    "Type": "AWS::EC2::Instance",
```

```
    "Properties": {...}
```

```
  }
```

```
}
```

```
}
```

- EC2Instance is just a name
- This has to be unique in each file
- This can be a string

# Resource Definition

```
{  
  ...  
  "Resources": {  
    "EC2Instance": {  
      "Type": "AWS::EC2::Instance",  
      "Properties": {...}  
    }  
  }  
}
```

# Resource Definition

```
{  
  ...  
  "Resources": {  
    "EC2Instance": {  
      "Type": "AWS::EC2::Instance",  
      "Properties": {...}  
    }  
  }  
}
```

```
"Type": "AWS::EC2::Instance",  
"Properties": {  
    "ImageId": "ami-bff32ccc",  
    "InstanceType": "t2.nano"  
}
```

## EC2 Instance

Depending on the Resource Type, there are different properties available

It is possible to specify AMI and Instance Type for an EC2 instance

# EC2 Instance

```
"EC2Instance": {  
  "Type": "AWS::EC2::Instance",  
  "Properties": {  
    "ImageId": "ami-bff32ccc",  
    "InstanceType": "t2.nano",  
    "NetworkInterfaces": [{"SubnetId": "..."}]  
  }  
}
```



```
"Type": "AWS::EC2::EIP",  
"Properties": {  
    "InstanceId": "i-d0f2e055",  
    "Domain": "vpc"  
}}
```

## Elastic IP

Properties of resource of type `AWS::EC2::EIP`

An Elastic IP address needs to be linked to an EC2 instance

Domain `vpc` as we are operating in a VPC

```
"Type": "AWS::EC2::SecurityGroup",  
"Properties": {  
    "GroupDescription": "ssh-bastion-host",  
    "VpcId": "vpc-6b53320e",  
    "SecurityGroupIngress": [{...}]  
}
```

## Security Group

Resource describing a Security Group

Includes link to VPC and nested ingress rules

```
"SecurityGroupIngress": [{  
  "CidrIp": "0.0.0.0/0",  
  "FromPort": 22,  
  "IpProtocol": "tcp",  
  "ToPort": 22  
}]
```

## Security Group Ingress

Nested ingress rules of Security Group

Allowing incoming TCP traffic from everywhere on port 22

# Dependencies Between Resources

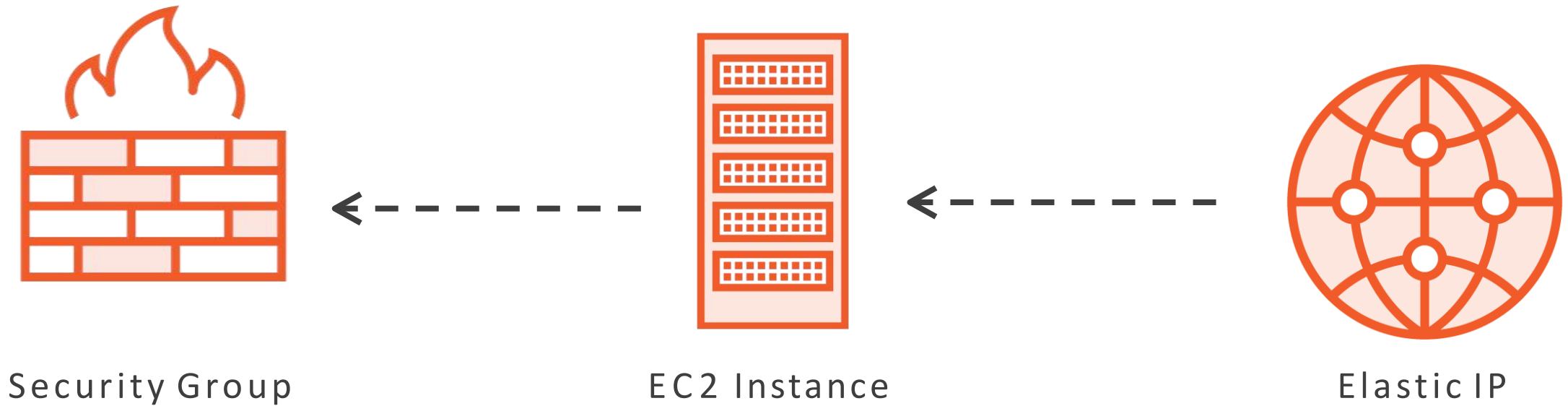
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CloudFormation is able to resolve dependencies between resources automatically

But how do you define dependencies within the template

# Dependencies Between Resources



# Referencing Security Group

```
"EC2Instance": {  
  "Properties": {  
    "NetworkInterfaces": [{  
      "GroupSet": [{"Ref": "SecurityGroup"}]  
    }  
  }  
},  
"SecurityGroup": {...}
```

# Referencing Security Group

```
"EC2Instance": {  
    "Properties": {  
        "NetworkInterfaces": [{  
            "GroupSet": [{"Ref": "SecurityGroup"}]  
        }  
    }  
},  
"SecurityGroup": {...}
```



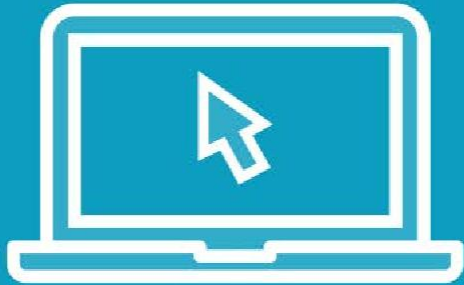
# Referencing EC2 Instance

```
"EC2Instance": {...},  
"ElasticIP": {  
    "Type": "AWS::EC2::EIP",  
    "Properties": {  
        "InstanceId": {"Ref": "EC2Instance"},  
        "Domain": "vpc"  
    }  
}
```

# Referencing EC2 Instance

```
"EC2Instance": {...},  
"ElasticIP": {  
  "Type": "AWS::EC2::EIP",  
  "Properties": {  
    "InstanceId": {"Ref": "EC2Instance"},  
    "Domain": "vpc"  
  }  
}
```

# Demo



Walk -through template

- EC2 Instance
- Security Group
- Elastic IP
- References between Resources

Create stack out of template by using  
Command Line Interface (CLI)

# Install and Configure AWS Command Line Interface (CLI)

<https://aws.amazon.com/cli/>

# Summary



## Minimal CloudFormation template

- Format Version
- Description
- Resources Section

Target state is defined within resources section

## Describing resources

- Name
- Resource Type
- Parameters