Elastic Beanstalk

Elastic Beanstalk – overview

AWS Elastic Beanstalk is a fully managed service provided by Amazon Web Services (AWS) that simplifies the deployment, scaling, and management of web applications and services. It abstracts the underlying infrastructure complexity and allows developers to focus on writing code rather than managing servers and infrastructure configurations.

Key Features of AWS Elastic Beanstalk:

1. **Easy Application Deployment:** Allows developers to deploy web applications and services (web servers, APIs, microservices) written in various programming languages, such as Java, .NET, Node.js, Python, PHP, Ruby, Go, and Docker containers.
2. **Automatic Environment Provisioning:** Manages the underlying infrastructure, including provisioning of resources (like EC2 instances, load balancers, databases), auto-scaling, load balancing, and capacity provisioning based on application requirements.
3. **Application Health Monitoring:** Monitors application health and performance metrics, provides logging and metrics collection via integration with AWS CloudWatch, allowing developers to track and analyze application performance.
4. **Managed Updates and Rollbacks:** Simplifies application updates and versioning by handling deployment updates and allowing easy rollback to previous versions if needed.
5. **Multiple Deployment Options:** Supports various deployment options, including single-instance or multi-instance environments, blue-green deployments, and can integrate with Continuous Integration/Continuous Deployment (CI/CD) pipelines.
6. **Integration with AWS Services:** Easily integrates with other AWS services such as RDS (Relational Database Service), S3 (Simple Storage Service), IAM (Identity and Access Management), and more, providing flexibility and scalability.

Use Cases for AWS Elastic Beanstalk:

1. **Web Application Hosting:** Hosting web applications, websites, APIs, and microservices with ease, without managing underlying infrastructure.
2. **Development and Testing:** Facilitating development and testing by providing an environment for deploying and testing applications quickly.
3. **Scalability and Load Management:** Handling fluctuating traffic loads by automatically scaling resources up or down based on demand.
4. **Simplified Deployment:** Streamlining the deployment process and managing infrastructure configurations, allowing developers to focus on writing code and accelerating time-to-market.
5. **Cost Optimization:** Optimizing costs by automatically managing resources and scaling as needed, helping to avoid over-provisioning of infrastructure.

AWS Elastic Beanstalk is suitable for developers and teams looking for a managed and scalable platform to deploy and manage web applications without the complexity of managing infrastructure configurations. It allows quick deployment, scalability, and ease of management for various types of web applications and services.

Developer problems on AWS

- Managing infrastructure
- Deploying Code
- Configuring all the databases, load balancers, etc
- Scaling concerns

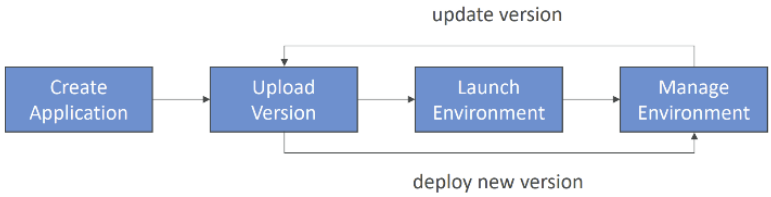
- Most web apps have the same architecture (ALB + ASG)
- All the developers want is for their code to run!
- Possibly, consistently across different applications and environments

Elastic Beanstalk – Overview

- Elastic Beanstalk is a developer centric view of deploying an application on AWS
- It uses all the component's we've seen before: EC2, ASG, ELB, RDS, …
- Managed service
  - Automatically handles capacity provisioning, load balancing, scaling, application health monitoring, instance configuration, …
  - Just the application code is the responsibility of the developer
- We still have full control over the configuration
- Beanstalk is free but you pay for the underlying instances

Elastic Beanstalk – Components

- **Application:** collection of Elastic Beanstalk components (environments, versions, configurations, …)
- **Application Version:** an iteration of your application code
- Environment
  - Collection of AWS resources running an application version (only one application version at a time)
  - **Tiers:** Web Server Environment Tier & Worker Environment Tier
  - You can create multiple environments (dev, test, prod, …)

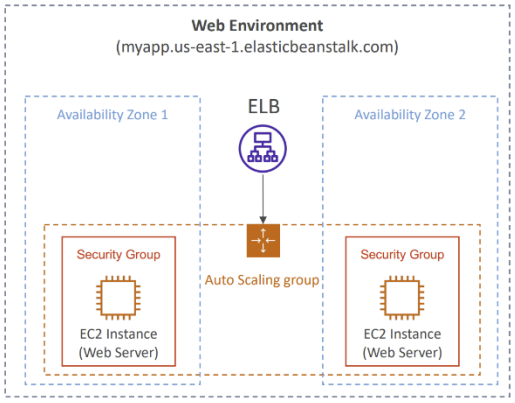


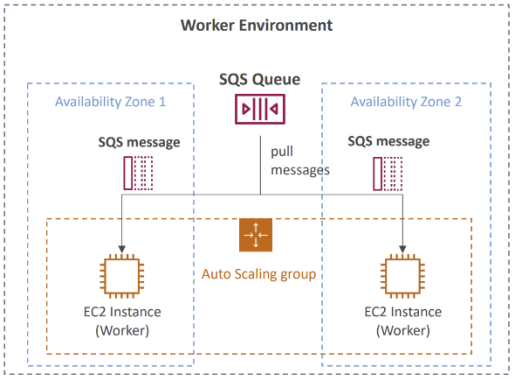
Elastic Beanstalk- Supported Platforms

- Go
- Java SE
- Java with Tomcat
- .NET Core on Linux
- .NET on Windows Server
- Node.js
- PHP
- Python
- Ruby
- Packer Builder
- Single Container Docker
- Multi-container Docker
- Preconfigured Docker

- If not supported, you can write your custom platform (advanced)

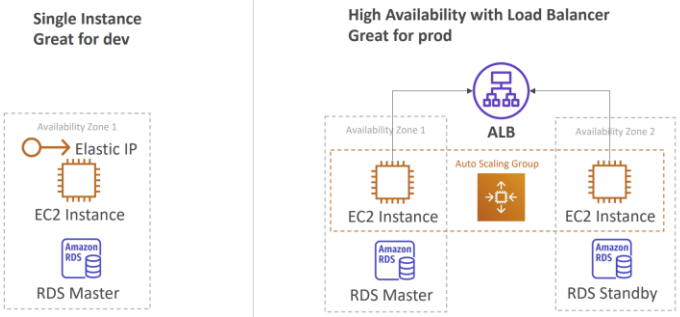
Web Server Tier vs. Worker Tier



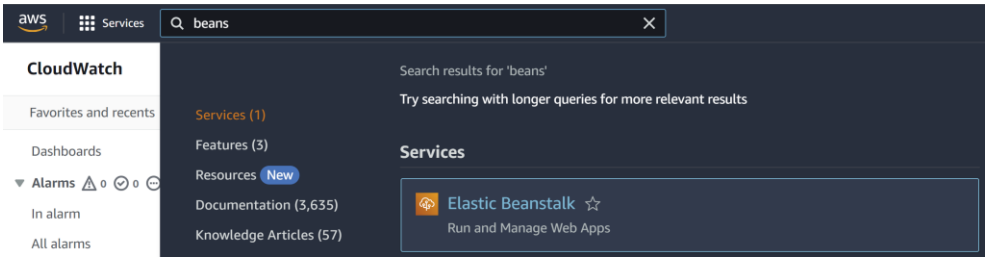


- Scale based on the number of SQS messages
- Can push messages to SQS queue from another Web Server Tier

Elastic Beanstalk Deployment Modes



Lab:




aws
Services
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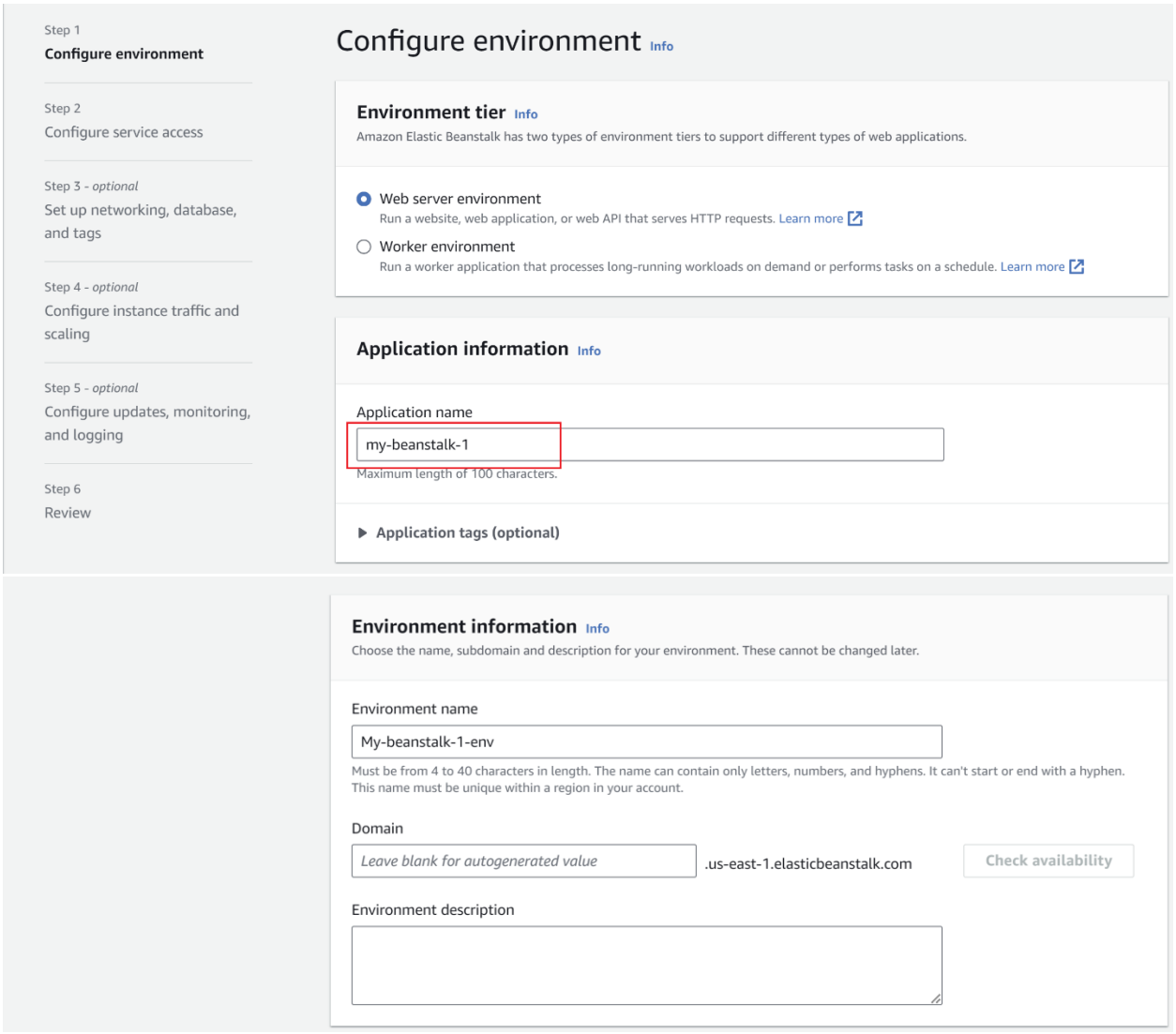
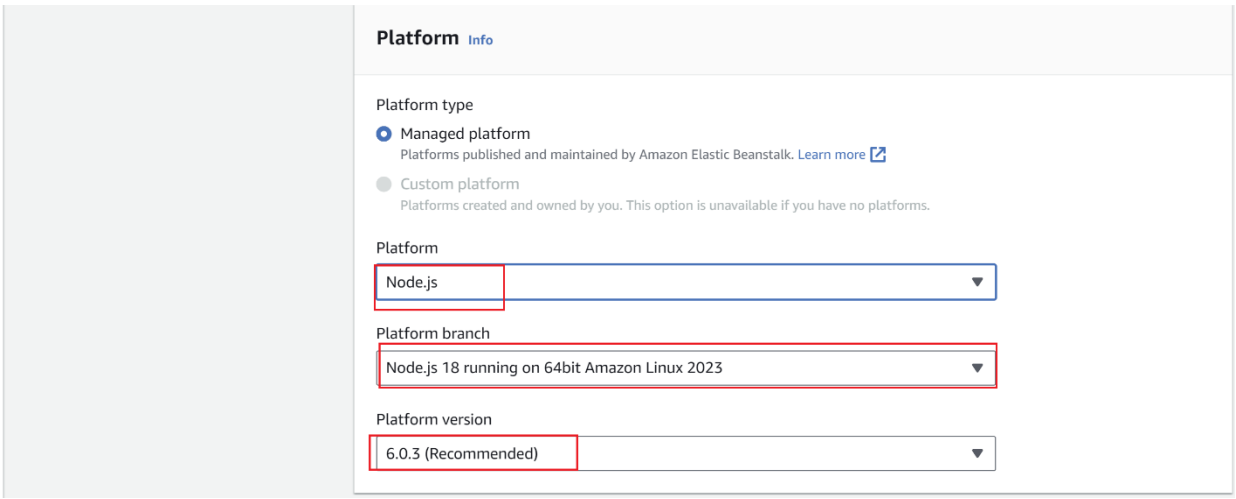
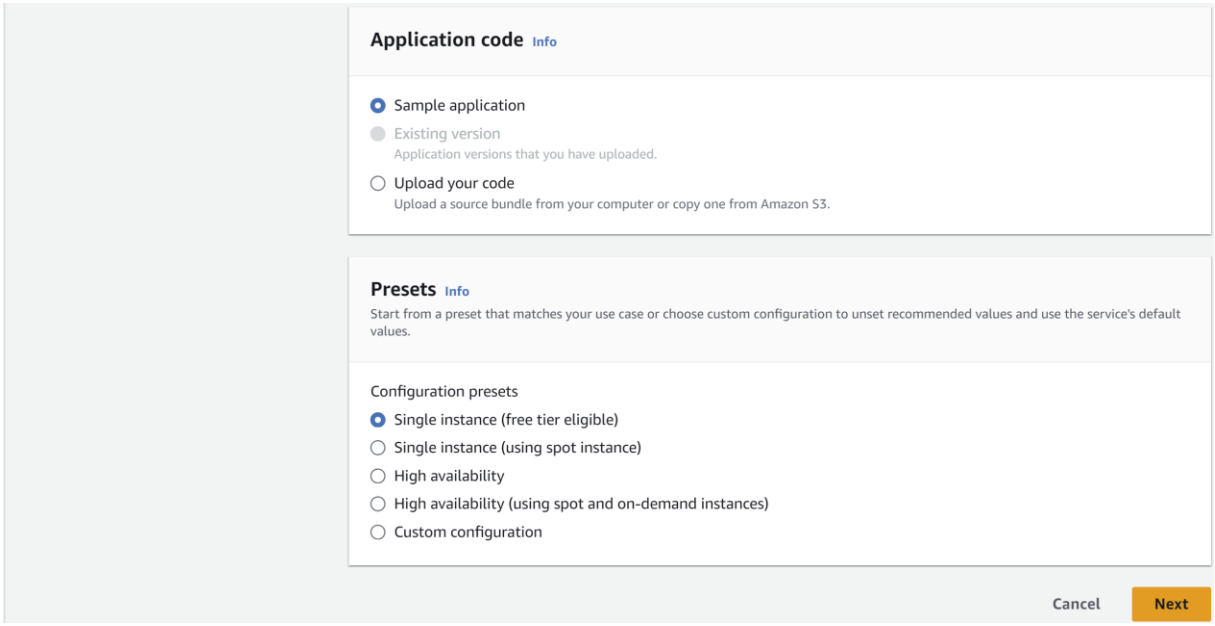
Compute
Amazon Elastic Beanstalk
End-to-end web application management.
Amazon Elastic Beanstalk is an easy-to-use service for deploying and scaling web applications and services developed with Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker on familiar servers such as Apache, Nginx, Passenger, and IIS.
Get started
Easily deploy your web application in minutes.
Create application

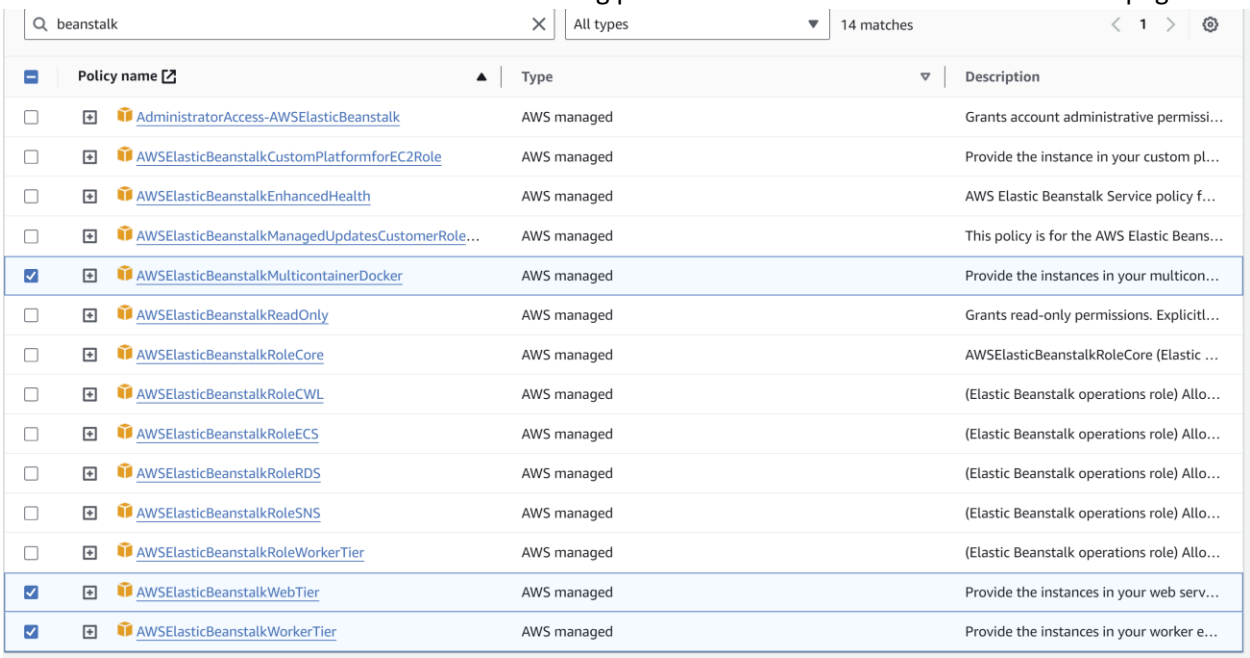

Step 1
Configure environment
Step 2
Configure service access
Step 3 - optional
Set up networking, database, and tags
Step 4 - optional
Configure instance traffic and scaling
Step 5 - optional
Configure updates, monitoring, and logging
Step 6
Review
Configure environment Info
Environment tier Info
Amazon Elastic Beanstalk has two types of environment tiers to support different types of web applications.
Web server environment
Run a website, web application, or web API that serves HTTP requests. Learn more
Worker environment
Run a worker application that processes long-running workloads on demand or performs tasks on a schedule. Learn more
Application information Info
Application name
my-beanstalk-1
Maximum length of 100 characters.
Application tags (optional)
Environment information Info
Choose the name, subdomain and description for your environment. These cannot be changed later.
Environment name
My-beanstalk-1-env
Must be from 4 to 40 characters in length. The name can contain only letters, numbers, and hyphens. It can't start or end with a hyphen. This name must be unique within a region in your account.
Domain
Leave blank for autogenerated value
.us-east-1.elasticbeanstalk.com
Check availability
Environment description



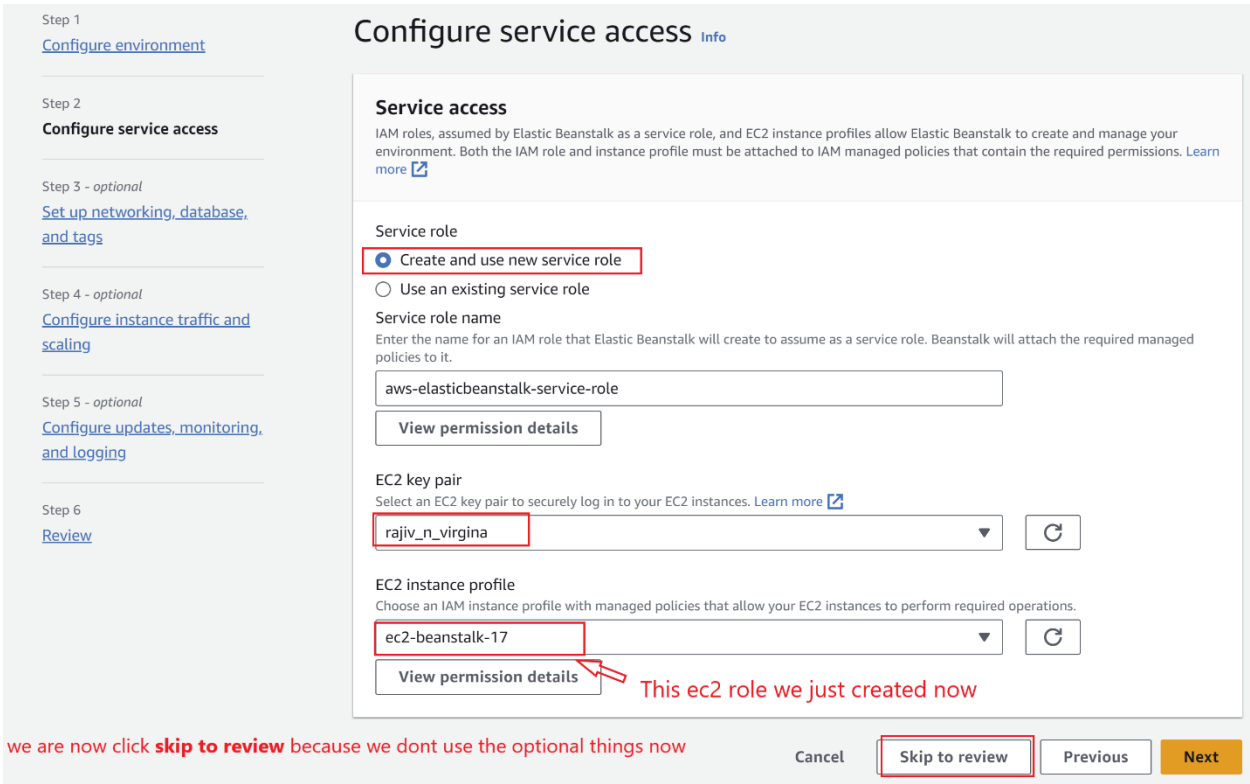
Keep rest of things same now click next



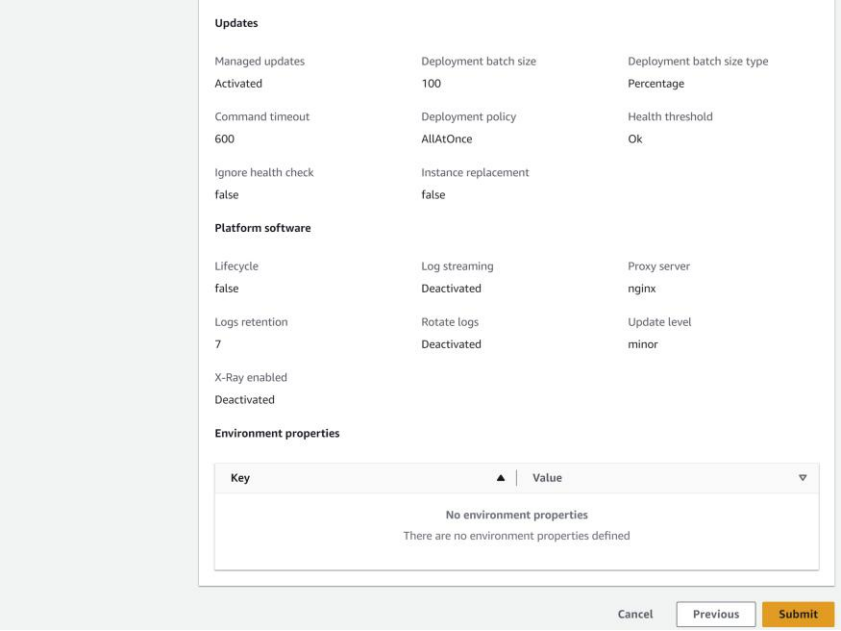
Now need to create and iam for with the following permissions role which is need in this next page



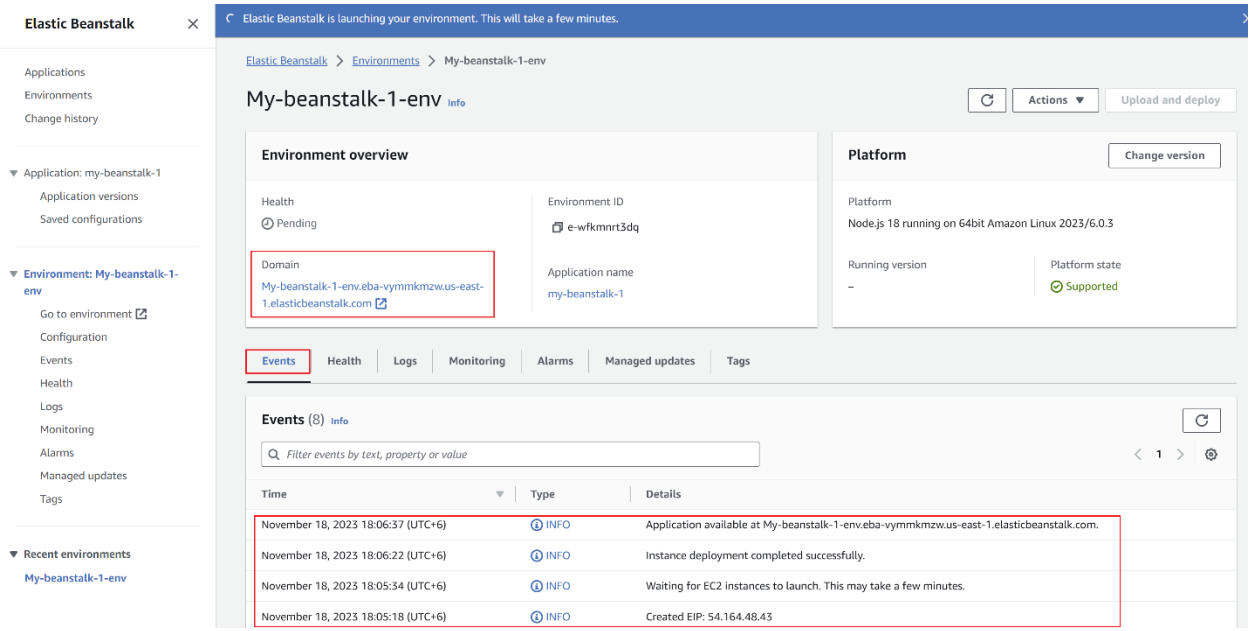
Now in screen chose the IAM role and click skip the review.



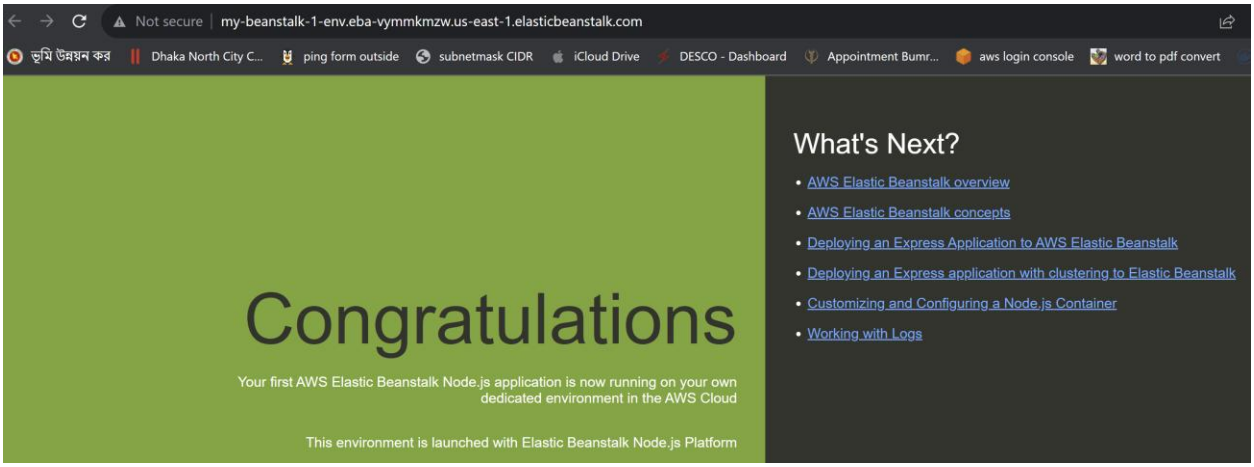
In the next page scroll down and submit



It will take some time to crate the beanstalk and in the backend it will use CloudFormation and create the resources we need. We the stapes by clicking on event.



After completing we can browse the domain

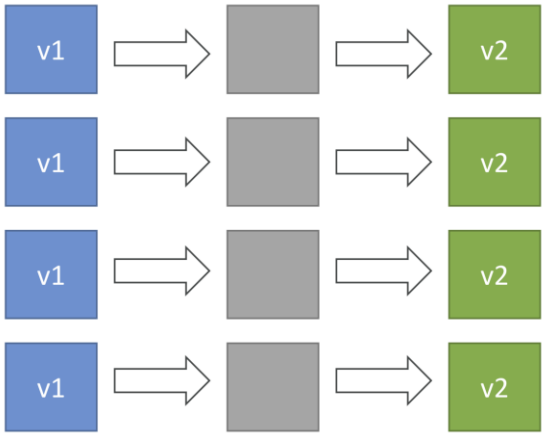


Beanstalk Deployment Options for Updates

- **All at once (deploy all in one go)** – fastest, but instances aren't available to serve traffic for a bit (downtime)
- **Rolling:** update a few instances at a time (bucket), and then move onto the next bucket once the first bucket is healthy
- **Rolling with additional batches:** like rolling, but spins up new instances to move the batch (so that the old application is still available)
- **Immutable:** spins up new instances in a new ASG, deploys version to these instances, and then swaps all the instances when everything is healthy
- **Blue Green:** create a new environment and switch over when ready
- **Traffic Splitting:** canary testing – send a small % of traffic to new deployment

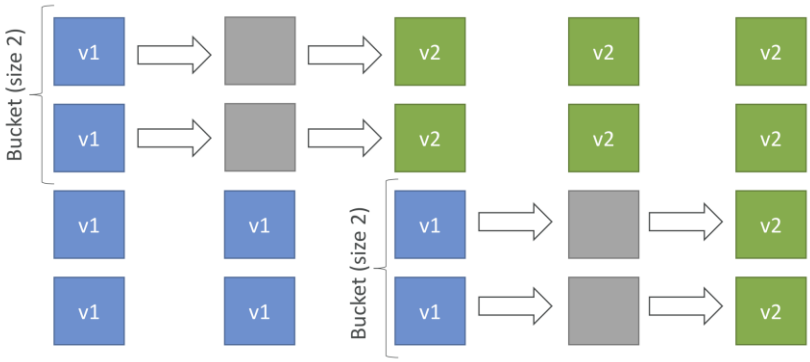
Elastic Beanstalk Deployment All at once

- Fastest deployment
- Application has downtime
- Great for quick iterations in development environment
- No additional cost



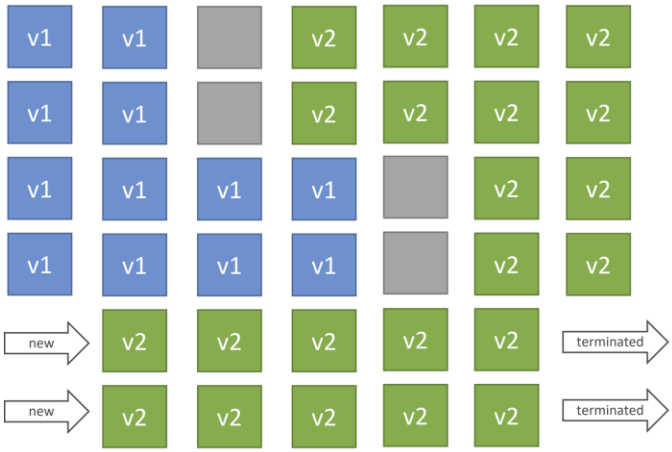
Elastic Beanstalk Deployment Rolling

- Application is running below capacity
- Can set the bucket size
- Application is running both versions simultaneously
- No additional cost
- Long deployment



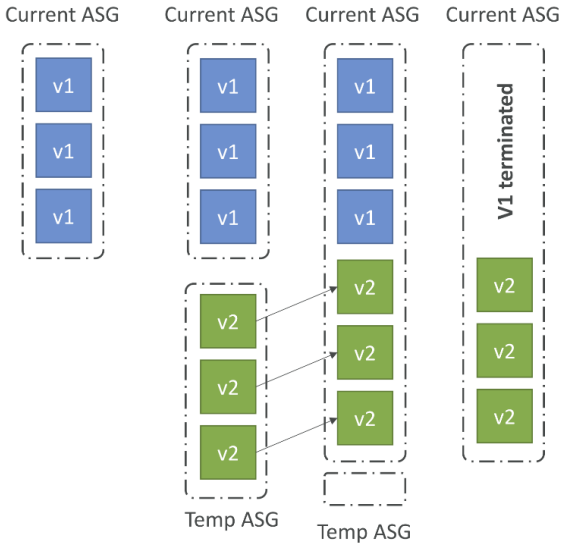
Elastic Beanstalk Deployment Rolling with additional batches

- Application is running at capacity
- Can set the bucket size
- Application is running both versions simultaneously
- Small additional cost
- Additional batch is removed at the end of the deployment
- Longer deployment
- Good for prod



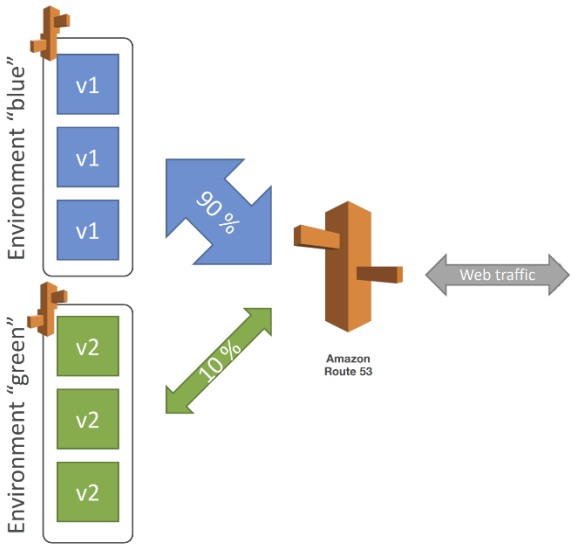
Elastic Beanstalk Deployment Immutable

- Zero downtime
- New Code is deployed to new instances on a temporary ASG
- High cost, double capacity
- Longest deployment
- Quick rollback in case of failures (just terminate new ASG)
- Great for prod



Elastic Beanstalk Deployment Blue / Green

- Not a "direct feature" of Elastic Beanstalk
- Zero downtime and release facility
- Create a new "stage" environment and deploy v2 there
- The new environment (green) can be validated independently and roll back if issues
- Route 53 can be setup using weighted policies to redirect a little bit of traffic to the stage environment
- Using Beanstalk, "swap URLs" when done with the environment test



Elastic Beanstalk -Traffic Splitting

- Canary Testing
- New application version is deployed to a temporary ASG with the same capacity
- A small % of traffic is sent to the temporary ASG for a configurable amount of time
- Deployment health is monitored
- If there's a deployment failure, this triggers an **automated rollback (very quick)**
- No application downtime
- New instances are migrated from the temporary to the original ASG
- Old application version is then terminated

Elastic Beanstalk Deployment Summary from AWS Doc

Deployment methods

Method	Impact of failed deployment	Deploy time	Zero downtime	No DNS change	Rollback process	Code deployed to
All at once	Downtime	🕒	x	✓	Manual redeploy	Existing instances
Rolling	Single batch out of service; any successful batches before failure running new application version	🕒🕒†	✓	✓	Manual redeploy	Existing instances
Rolling with an additional batch	Minimal if first batch fails; otherwise, similar to **Rolling**	🕒🕒🕒†	✓	✓	Manual redeploy	New and existing instances
Immutable	Minimal	🕒🕒🕒🕒	✓	✓	Terminate new instances	New instances
Traffic splitting	Percentage of client traffic routed to new version temporarily impacted	🕒🕒🕒🕒††	✓	✓	Reroute traffic and terminate new instances	New instances
Blue/green	Minimal	🕒🕒🕒🕒	✓	x	Swap URL	New instances

https://docs.aws.amazon.com/elasticbeanstalk/latest/dg/using-features.deploy-existing-version.html

Elastic Beanstalk CLI

- We can install an additional CLI called the "EB cli" which makes working with Beanstalk from the CLI easier
- Basic commands are:
  - eb create
  - eb status
  - eb health
  - eb events
  - eb logs
  - eb open
  - eb deploy
  - eb config
  - eb terminate
- It's helpful for your automated deployment pipelines!

Elastic Beanstalk Deployment Process

- Describe dependencies
  (requirements.txt for Python, package.json for Node.js)
- Package code as zip, and describe dependencies
  - Python: requirements.txt
  - Node.js: package.json
- **Console:** upload zip file (creates new app version), and then deploy
- **CLI:** create new app version using CLI (uploads zip), and then deploy

- Elastic Beanstalk will deploy the zip on each EC2 instance, resolve dependencies and start the application