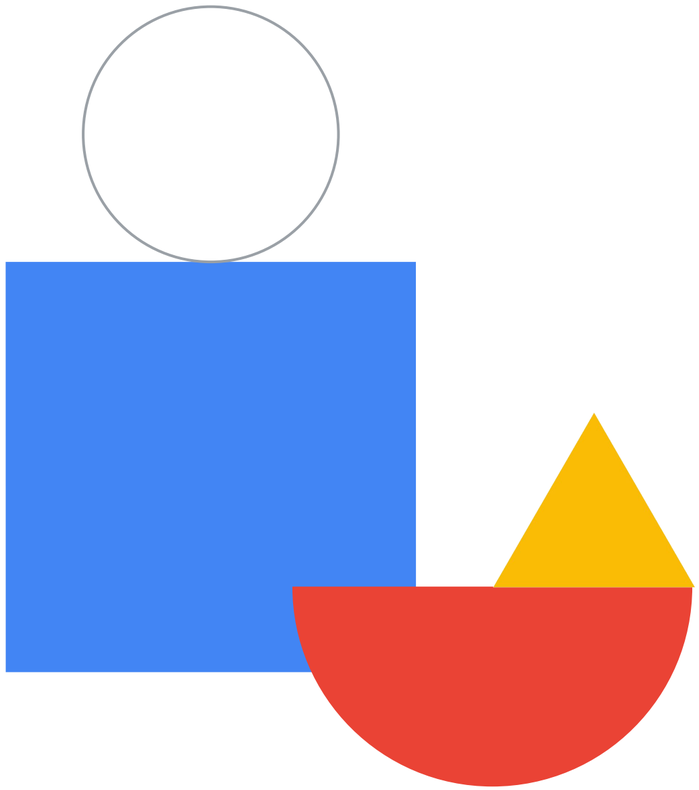
Google Cloud



Preparing for Your Professional Cloud Architect Journey

Module 4: Analyzing and Optimizing Technical and Business Processes

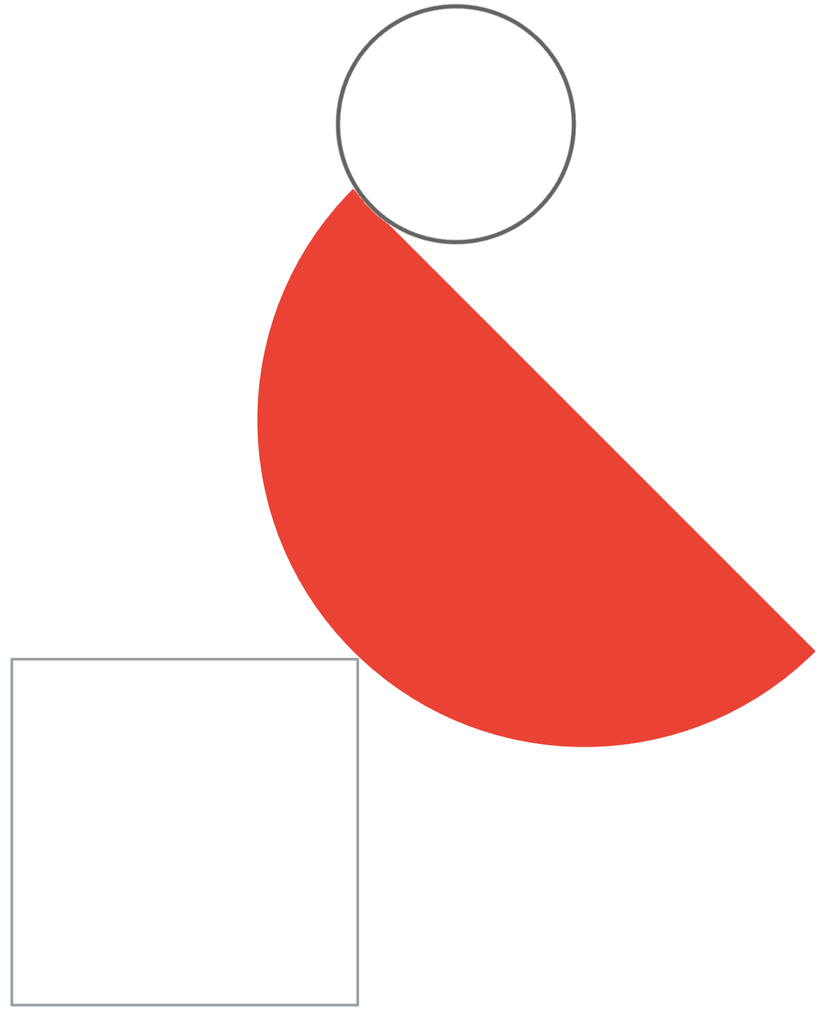
Module agenda

01 Optimizing Cymbal Direct’s technical and business processes and procedures for the cloud

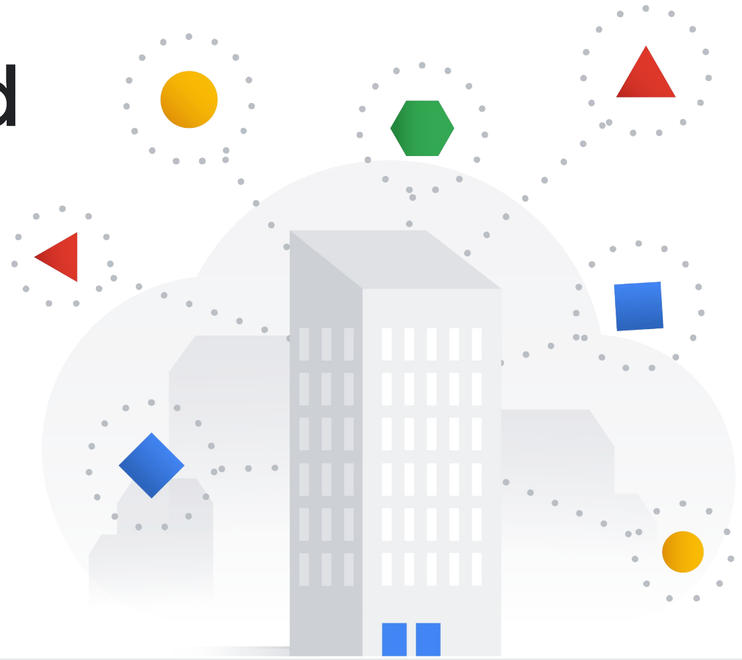
02 Diagnostic questions

03 Review and study planning

Optimizing Cymbal Direct's technical and business processes and procedures for the cloud



Your role in optimizing business and technical processes



- Analyzing and defining technical processes
- Analyzing and defining business processes
- Developing procedures to ensure reliability of solutions in production

Cymbal Direct

Business Requirements

- Cymbal Direct’s management wants to make sure that they can easily scale to handle additional demand when needed, so they can feel comfortable with expanding to more test markets.
- Streamline development for application modernization and new features/products.
- Ensure that developers spend as much time on core business functionality as possible, and not have to worry about scalability wherever possible.
- Allow for partners to order directly via API
- Get a production version of the social media highlighting service up and running, and ensure no inappropriate content

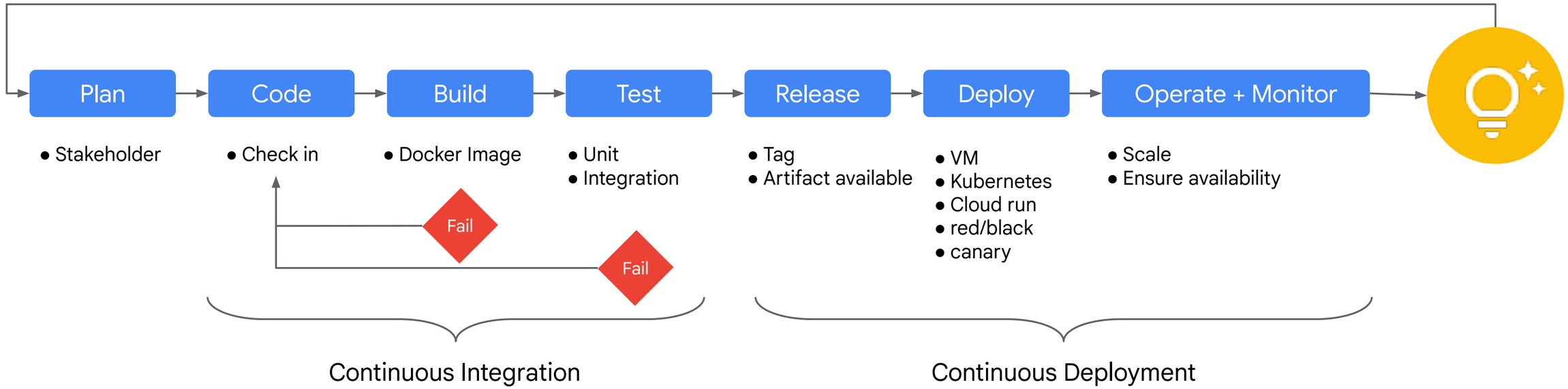
Technical Requirements

- Move to managed services wherever possible
- Ensure that developers can deploy container based workloads to testing and production environments in a highly scalable environment.
- Standardize on containers where possible, but also allow for existing virtualization infrastructure to run as-is without a re-write, so it can be slowly refactored over-time
- Securely allow partner integration
- Allow for streaming of IoT data from drones

Process optimization

The current build process at Cymbal Direct is:

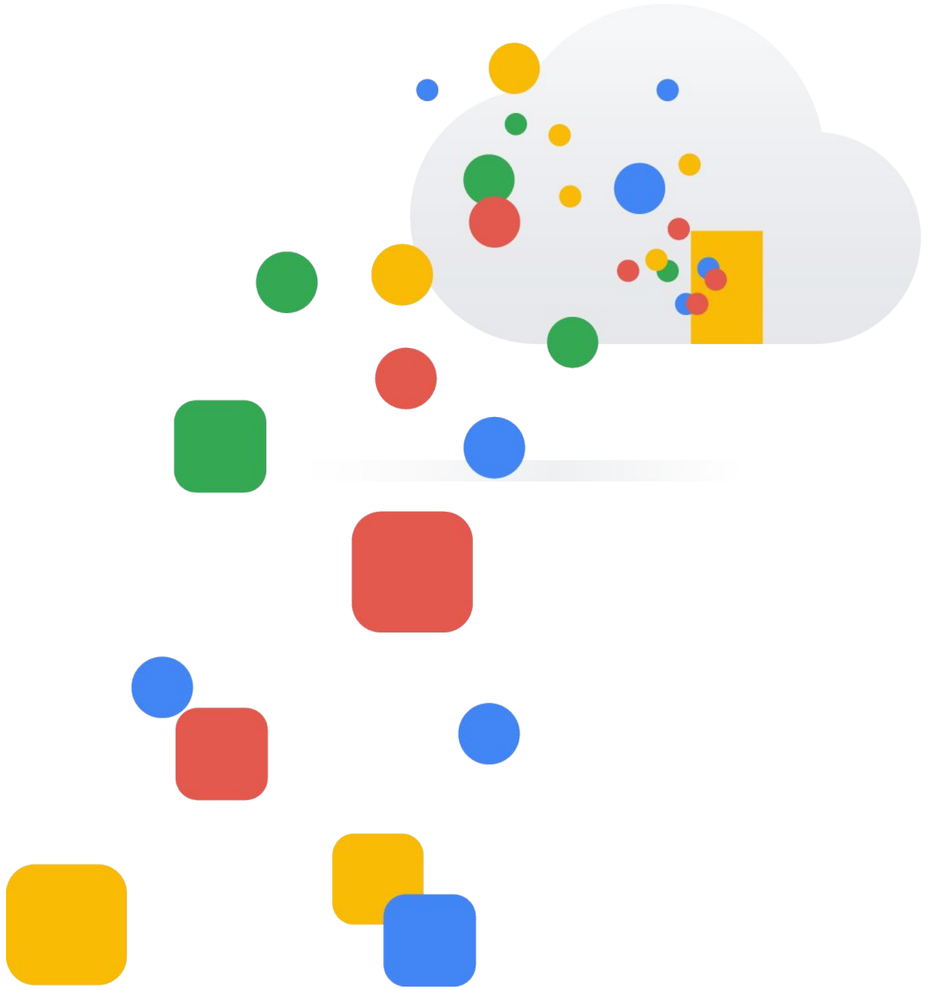
- Package monolithic application with its dependencies
- Check it in and notify the QA team they need to test it
- Stress test the application to ensure it performs well
- Build a VM image for deployment



Process optimization

Ways in which requirements are not met:

- Development is not streamlined.
- Developers cannot focus on core business functionality.
- Moving to managed services is not possible.
- Deploying to container-based workloads is not possible.



Process optimization

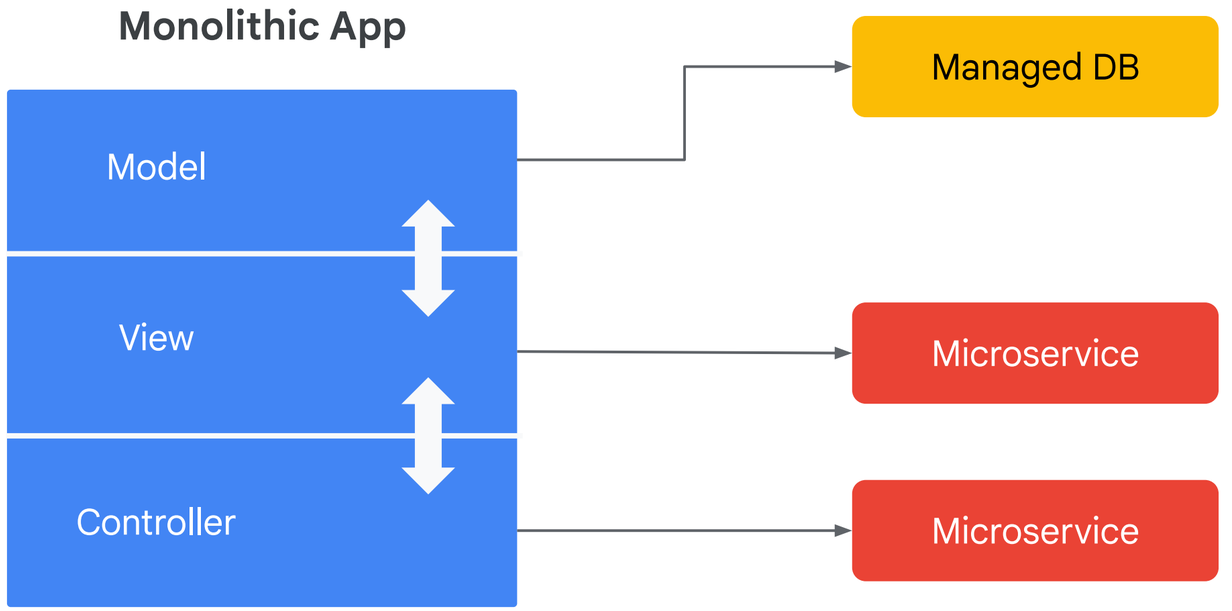
New Process

- New features are implemented as microservices in Docker containers
- Code check-in triggers CI/CD pipeline w/ automatic test & release
- Code is deployed to Cloud Run

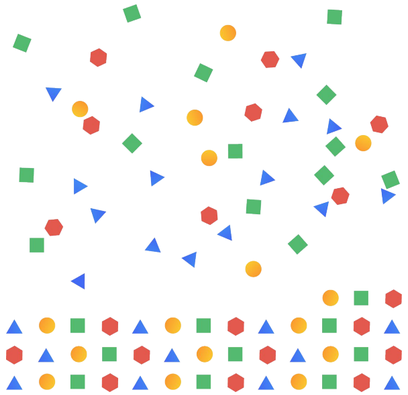
Ensuring reliability by leveraging microservices

Refactor monoliths to microservices

- Simplifies releasing
- Isolates change
- Simpler to test

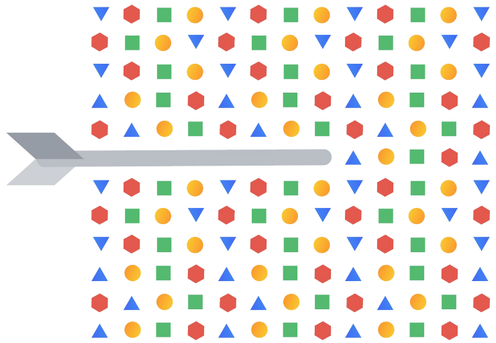


Developing Cymbal Direct's procedures to ensure solution reliability



Chaos Engineering

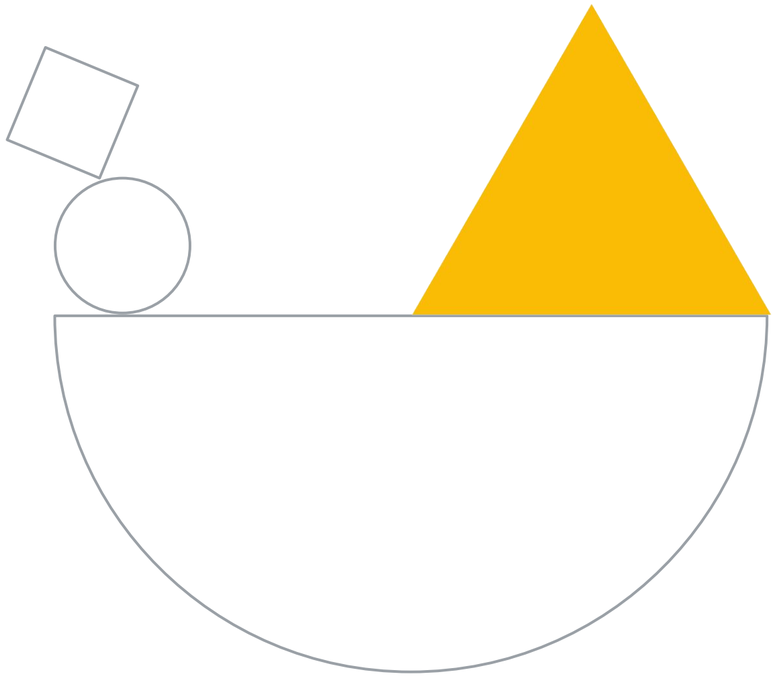
- Creates a culture of reliability
- Crashes systems intentionally to build resiliency



Penetration testing

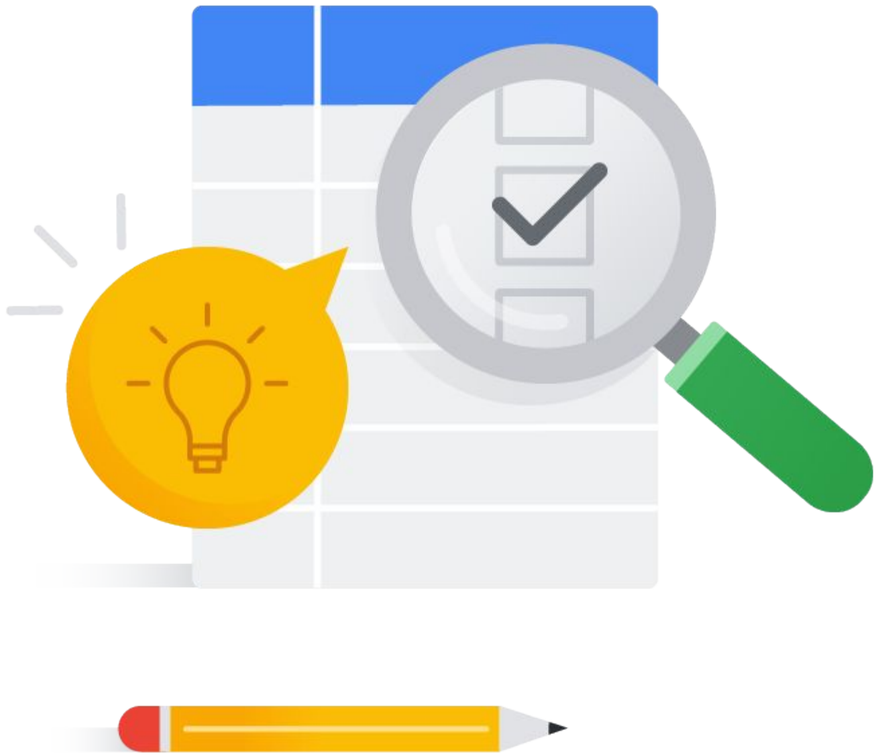
- Mimics the behavior of hackers to attack your own environment

Diagnostic questions

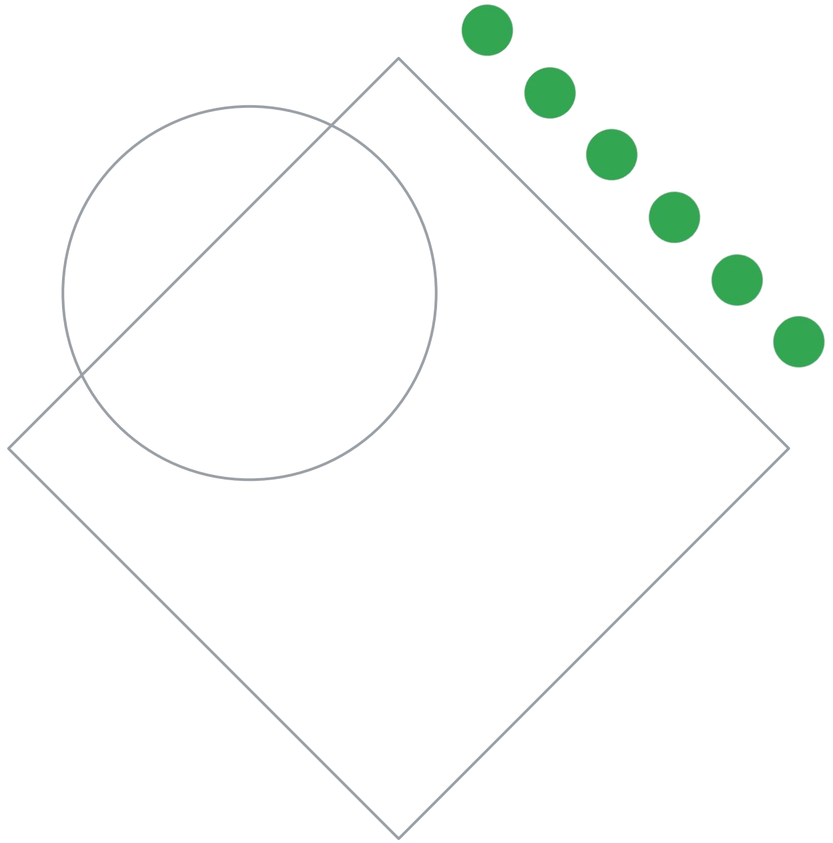


Please complete the diagnostic questions now

- The diagnostic questions are available in the workbook.

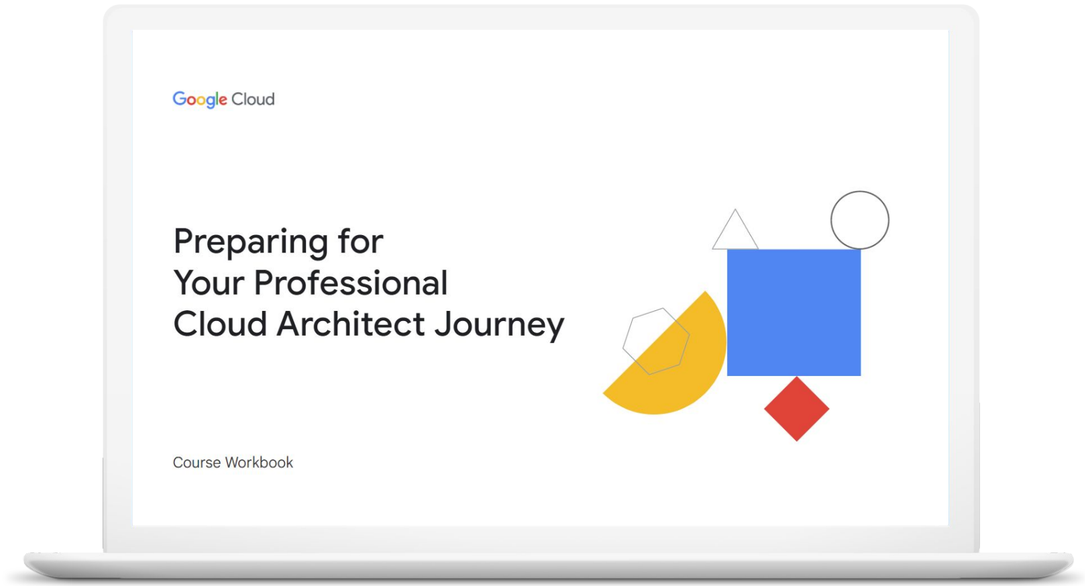


Review and study planning



Your study plan:

Analyzing and optimizing technical and business processes



4.1 Analyzing and defining technical processes

4.2 Analyzing and defining business processes

4.3 Developing procedures to ensure reliability of solutions in production

4.1 Analyzing and defining technical processes

Considerations include:

- Software development life cycle (SDLC)
- Continuous integration / continuous deployment
- Troubleshooting / root cause analysis best practices
- Testing and validation of software and infrastructure
- Service catalog and provisioning
- Business continuity and disaster recovery

4.1 Diagnostic Question 01 Discussion

You are asked to implement a lift and shift operation for Cymbal Direct's Social Media Highlighting service. You **compose a Terraform configuration file** to build all the necessary Google Cloud resources.

What is the next step in the Terraform workflow for this effort?

A. **Commit the configuration file** to your software repository.

B. Run **terraform plan** to verify the contents of the Terraform configuration file.

C. Run **terraform apply** to deploy the resources described in the configuration file.

D. Run **terraform init** to download the necessary provider modules.

4.1 Diagnostic Question 01 Discussion

You are asked to implement a lift and shift operation for Cymbal Direct's Social Media Highlighting service. You **compose a Terraform configuration file** to build all the necessary Google Cloud resources.

What is the next step in the Terraform workflow for this effort?

A. **Commit the configuration file** to your software repository.

B. Run **terraform plan** to verify the contents of the Terraform configuration file.

C. Run **terraform apply** to deploy the resources described in the configuration file.

D. Run **terraform init** to download the necessary provider modules.

4.1 Diagnostic Question 02 Discussion

You have implemented a manual **CI/CD process for the container services** required for the next implementation of the Cymbal Direct's Drone Delivery project. You want to **automate the process**.

What should you do?

A. **Implement and reference a source repository** in your Cloud Build configuration file.

B. **Implement a build trigger** that applies your build configuration when a new software update is committed to Cloud Source Repositories.

C. **Specify the name** of your Container Registry in your Cloud Build configuration.

D. **Configure and push a manifest fil**e into an environment repository in Cloud Source Repositories.

4.1 Diagnostic Question 02 Discussion

You have implemented a manual **CI/CD process for the container services** required for the next implementation of the Cymbal Direct's Drone Delivery project. You want to **automate the process**.

What should you do?

A. **Implement and reference a source repository** in your Cloud Build configuration file.

B. **Implement a build trigger** that applies your build configuration when a new software update is committed to Cloud Source Repositories.

C. **Specify the name** of your Container Registry in your Cloud Build configuration.

D. **Configure and push a manifest fil**e into an environment repository in Cloud Source Repositories.

4.1 Diagnostic Question 03 Discussion

You have an application implemented on **Compute Engine.** You want to **increase the durability** of your application.

What should you do?

A. Implement a **scheduled snapshot** on your Compute Engine instances.

B. Implement a **regional managed instance group.**

C. Monitor your application's usage metrics and implement **autoscaling**.

D. Perform **health checks** on your Compute Engine instances.

4.1 Diagnostic Question 03 Discussion

You have an application implemented on **Compute Engine.** You want to **increase the durability** of your application.

What should you do?

A. Implement a **scheduled snapshot** on your Compute Engine instances.

B. Implement a **regional managed instance group.**

C. Monitor your application's usage metrics and implement **autoscaling**.

D. Perform **health checks** on your Compute Engine instances.

4.1 Diagnostic Question 04 Discussion

Developers on your team frequently write new versions of the code for one of your applications. You want to **automate the build process when updates are pushed to Cloud Source Repositories.**

What should you do?

A. Implement a **Cloud Build configuration file** with build steps.

B. Implement a **build trigger** that references your repository and branch.

C. Set proper **permissions** for Cloud Build to access deployment resources.

D. Upload **application updates and Cloud Build configuration files** to Cloud Source Repositories.

4.1 Diagnostic Question 04 Discussion

Developers on your team frequently write new versions of the code for one of your applications. You want to **automate the build process when updates are pushed to Cloud Source Repositories.**

What should you do?

A. Implement a **Cloud Build configuration file** with build steps.

B. Implement a **build trigger** that references your repository and branch.

C. Set proper **permissions** for Cloud Build to access deployment resources.

D. Upload **application updates and Cloud Build configuration files** to Cloud Source Repositories.

4.1 Diagnostic Question 05 Discussion

Your development team used **Cloud Source Repositories**, **Cloud Build**, and **Artifact Registry** to successfully implement the build portion of an application's CI/CD process.. However, the deployment process is erroring out. Initial troubleshooting shows that the **runtime environment does not have access to the build images.** You need to advise the team on how to resolve the issue.

What could cause this problem?

A. The r**untime environment does not have permissions to the Artifact Registry** in your current project.

B. The **runtime environment does not have permissions** to **Cloud Source Repositories** in your current project.

C. The Artifact Registry might be in a **different project.**

D. You need to specify the Artifact Registry **image by name.**

4.1 Diagnostic Question 05 Discussion

Your development team used **Cloud Source Repositories**, **Cloud Build**, and **Artifact Registry** to successfully implement the build portion of an application's CI/CD process.. However, the deployment process is erroring out. Initial troubleshooting shows that the **runtime environment does not have access to the build images.** You need to advise the team on how to resolve the issue.

What could cause this problem?

A. The r**untime environment does not have permissions to the Artifact Registry** in your current project.

B. The **runtime environment does not have permissions** to **Cloud Source Repositories** in your current project.

C. The Artifact Registry might be in a **different project.**

D. You need to specify the Artifact Registry **image by name.**

4.1 Diagnostic Question 06 Discussion

You are implementing a **disaster recovery plan** for the cloud version of your drone solution. **Sending videos to the pilots** is crucial from an operational perspective.

What design pattern should you choose for this part of your architecture?

A. **Hot** with a **low** recovery time objective (RTO)
B. **Warm** with a **high** recovery time objective (RTO)
C. **Cold** with a **low** recovery time objective (RTO)
D. **Hot** with a **high** recovery time objective (RTO)

4.1 Diagnostic Question 06 Discussion

You are implementing a **disaster recovery plan** for the cloud version of your drone solution. **Sending videos to the pilots** is crucial from an operational perspective.

What design pattern should you choose for this part of your architecture?

A. **Hot** with a **low** recovery time objective (RTO)
B. **Warm** with a **high** recovery time objective (RTO)
C. **Cold** with a **low** recovery time objective (RTO)
D. **Hot** with a **high** recovery time objective (RTO)

4.1 Diagnostic Question 07 Discussion

The number of requests received by your application is **nearing the maximum specified in your design**. You want to **limit the number of incoming requests** until the system can handle the workload.

What design pattern does this situation describe?

A. Applying a **circuit breaker**
B. Applying **exponential backoff**
C. Increasing **jitter**
D. Applying **graceful degradation**

4.1 Diagnostic Question 07 Discussion

The number of requests received by your application is **nearing the maximum specified in your design**. You want to **limit the number of incoming requests** until the system can handle the workload.

What design pattern does this situation describe?

A. Applying a **circuit breaker**

B. Applying **exponential backoff**

C. Increasing **jitter**

D. Applying **graceful degradation**

4.1 Diagnostic Question 08 Discussion

The pilot subsystem in your Delivery by Drone service is critical to your service. You want to ensure that **connections to the pilots can survive a VM outage** without affecting connectivity.

What should you do?

A. Configure proper **startup scripts** for your VMs.

B. Deploy a **load balancer** to distribute traffic across multiple machines.

C. Create **persistent disk snapshots**.

D. Implement a **managed instance group** and **load balancer**.

4.1 Diagnostic Question 08 Discussion

The pilot subsystem in your Delivery by Drone service is critical to your service. You want to ensure that **connections to the pilots can survive a VM outage** without affecting connectivity.

What should you do?

A. Configure proper **startup scripts** for your VMs.

B. Deploy a **load balancer** to distribute traffic across multiple machines.

C. Create **persistent disk snapshots**.

D. Implement a **managed instance group** and **load balancer**.

4.1 Diagnostic Question 09 Discussion

Cymbal Direct wants to improve its drone pilot interface. You want to **collect feedback on proposed changes** from the community of pilots **before rolling out updates systemwide**.

What type of deployment pattern should you implement?

A. You should implement **canary testing.**

B. You should implement **A/B testing.**

C. You should implement a **blue/green deployment.**

D. You should implement an **in-place release.**

4.1 Diagnostic Question 09 Discussion

Cymbal Direct wants to improve its drone pilot interface. You want to **collect feedback on proposed changes** from the community of pilots **before rolling out updates systemwide**.

What type of deployment pattern should you implement?

A. You should implement **canary testing.**

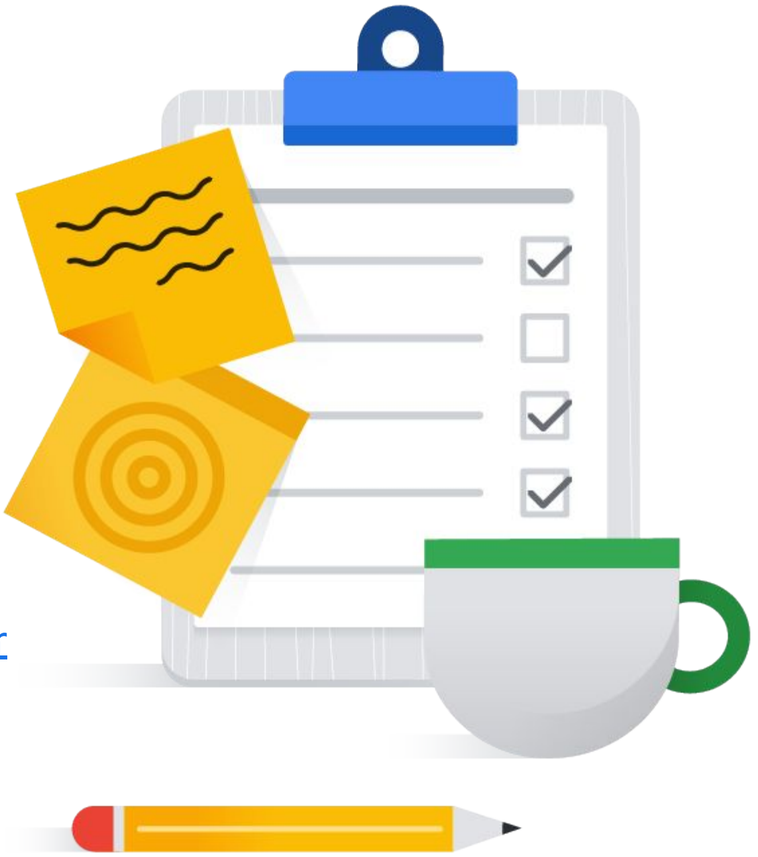
B. You should implement **A/B testing.**

C. You should implement a **blue/green deployment.**

D. You should implement an **in-place release.**

4.1 Analyzing and defining technical processes

Resources to start your journey



[Securing the software development lifecycle with Cloud Build and SLSA]

[CI/CD with Google Cloud]

[Site Reliability Engineering]

[DevOps tech: Continuous testing | Google Cloud]

[Application deployment and testing strategies | Cloud Architecture Center]

[Chapter 17 - Testing for Reliability]

[Service Catalog documentation | Google Cloud]

[What is Disaster Recovery? | Google Cloud]

[API design guide]

4.2 Analyzing and defining business processes

Considerations include:

- Stakeholder management (e.g. influencing and facilitation)
- Change management
- Team assessment / skills readiness
- Decision-making processes
- Customer success management
- Cost optimization / resource optimization (capex / opex)

4.2 Analyzing and defining business processes

Resources to start your journey

[What is Digital Transformation?]

[Cloud Cost Optimization: Principles for Lasting Success]

[Cost Optimization on Google Cloud for Developers and Operators]

[Certification solutions for Team Readiness]

4.3 Developing procedures to ensure reliability of solutions in production

- Chaos engineering
- Penetration testing

4.3 Diagnostic Question 10 Discussion

You want to establish **procedures for testing the resilience** of the delivery-by-drone solution.

A. **Block access** to **storage assets** in one of your zones.
B. Inject a **bad health check f**or one or more of your resources.
C. **Load test your application** to see how it responds.
D. **Block access** to all **resources** in a zone.

How would you simulate a scalability issue?

4.3 Diagnostic Question 10 Discussion

You want to establish **procedures for testing the resilience** of the delivery-by-drone solution.

A. **Block access** to **storage assets** in one of your zones.

B. Inject a **bad health check f**or one or more of your resources.

C. **Load test your application** to see how it responds.

D. **Block access** to all **resources** in a zone.

How would you simulate a scalability issue?

4.3 Developing procedures to ensure reliability of solutions in production

Resources to start your journey

Site Reliability Engineering

Site Reliability Engineering (SRE) | Google Cloud

Patterns for scalable and resilient apps | Cloud Architecture Center

How to achieve a resilient IT strategy with Google Cloud

Patterns for scalable and resilient apps | Cloud Architecture Center

Disaster recovery planning guide | Cloud Architecture Center

Knowledge Check 1

Cymbal Direct needs a database for their next project. They want to meet their business and technical objectives. What should they do?

A. Install MySQL on a Compute engine instance

B. Install CockroachDB on a managed instance group

C. Use a NoSQL database

D. Use a Managed Database Service

Knowledge Check 1

Cymbal Direct needs a database for their next project. They want to meet their business and technical objectives. What should they do?

A. Install MySQL on a Compute engine instance

B. Install CockroachDB on a managed instance group

C. Use a NoSQL database

D. Use a Managed Database Service

Knowledge Check 2

Cymbal Direct has decided to use Cloud Build. Which technical requirement justifies this decision?

A. Securely allow partner integration

B. Allow for streaming of IoT data from drones

C. Ensure that developers can deploy container based workloads

D. Let partners order directly via API

Knowledge Check 2

Cymbal Direct has decided to use Cloud Build. Which technical requirement justifies this decision?

A. Securely allow partner integration

B. Allow for streaming of IoT data from drones

C. Ensure that developers can deploy container based workloads

D. Let partners order directly via API