



Reliable Cloud Infrastructure:
Design and Process

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[P]Hello, I'm Philipp Maier, a course developer at Google [S] and I'm Stephanie Wong, a Developer Advocate at Google. We want to welcome you to the Reliable Cloud Infrastructure: Design and Process course.

[P] This course is about architecting, design and process. A cloud architect's job is to determine which cloud services to use in order to most effectively implement the applications and services they are building. [S] This is not an easy job.

[P] That's right. Many services seem interchangeable. In many cases multiple, different services would work for the same use case.

[S] The intent of this course is to simulate the process you can use to design a system that will run on Google Cloud.

This course covers Google Cloud architecture, design, and process

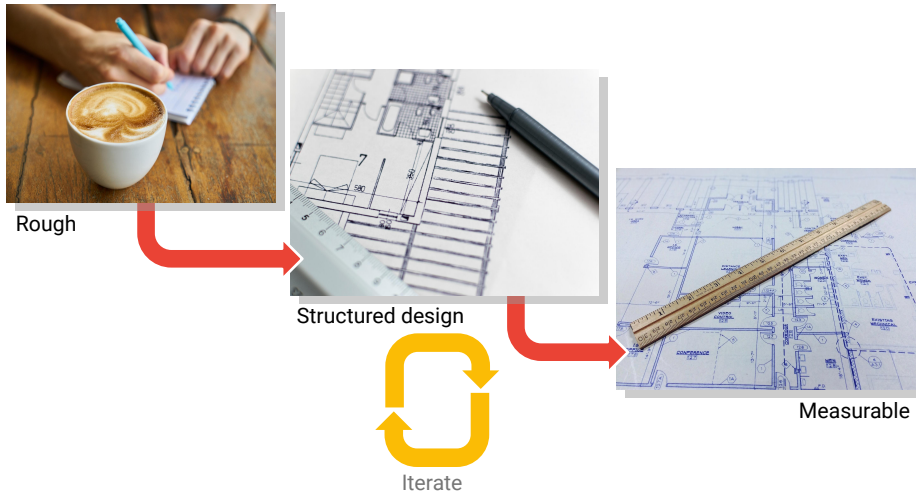


[S] This course is not about implementing specific cloud features. It's about architecture, design, and process.

[P] We like to joke that the job of an architect is to draw rectangles and point arrows at them,

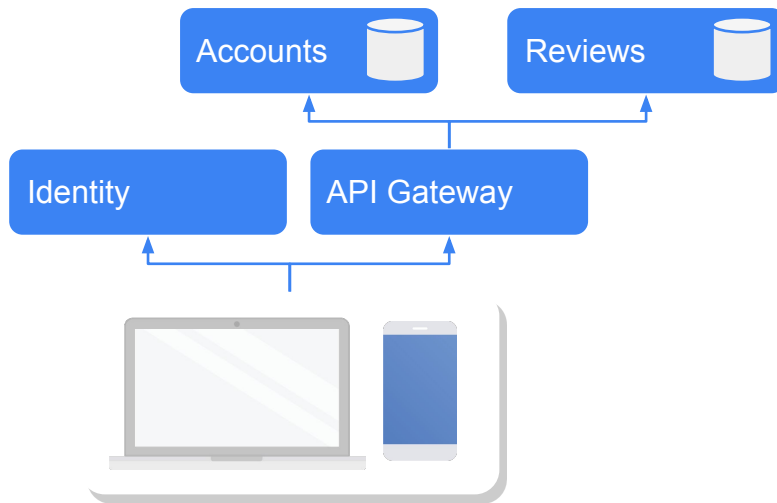
[S] which to a certain extent is true. That is an important step in designing complex systems. In this course you will focus on that design and planning.

You will define application requirements



[S] Specifically, you will work on architecting and designing a case study in this course. The starting point for any software development is to figure out what the software is supposed to do, who your users are and why is this important. You will begin with this requirements gathering phase.

Architect your application using microservices



[P] Once you understand your software's requirements and your users, you can start laying out the overall design. In software this is a process of decomposition: breaking the big thing (your program) into smaller manageable units that you can start programming. In a modern, cloud-based system, it is considered a best practice to break your application into microservices.

[S] *Microservices* refers to an architectural style for developing applications. Microservices allow a large application to be decomposed into independent constituent parts, with each part having its own area of responsibility. To serve a single user or API request, a microservices-based application can call many internal microservices to compose its response.

[P] The architecture in the course will be microservice-based. This has a significant effect on the agility of the application in aspects such as development speed, deployment, and monitoring. We will consider the advantages and disadvantages of this architectural style.

Choose the best storage and deployment services using objective criteria



[P] We'll also help you choose the best storage and deployment services using objective criteria.

[S] Choosing the right ones can be complicated. Do you want a relational database, a NoSQL database, or a data warehouse? You also need to consider your compute platform. Do you want to deploy your apps to virtual machines, a Kubernetes cluster, or an automated platform like App Engine?

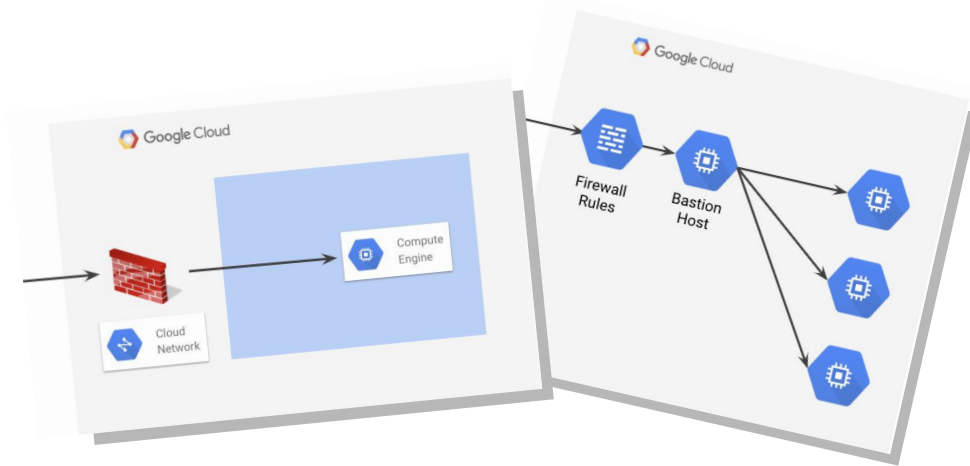
[P] You will learn what the factors are and how to choose the right services for your various microservices.

Leverage Google Cloud services for reliability



[S] Google provides many services that you can use to make your applications reliable. Availability, durability, cost, and disaster recovery are all important considerations when designing systems. If you understand your requirements, you can choose the right Google Cloud services to meet your applications' goals for reliability while optimizing costs.

Of course, you will design with security in mind

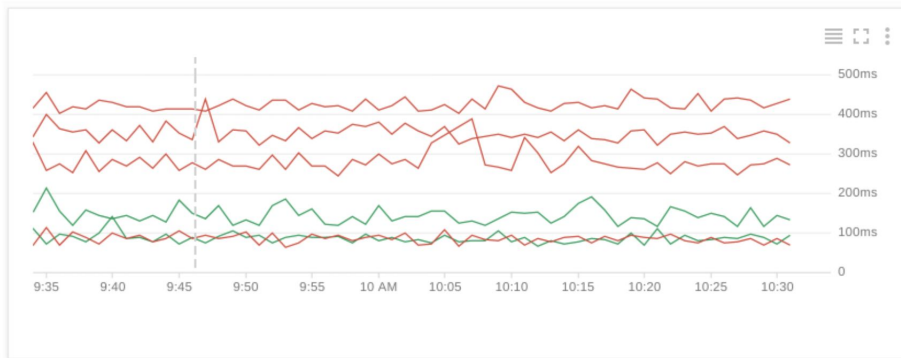


[P] Now, there's a saying: security is not icing on the cake, it is baked into the cake. Before implementing a system on Google Cloud, you should carefully consider its security requirements and use the appropriate security services. Security in computer systems is implemented in layers. Google Cloud handles some things for you.

[S] For example, Google secures the physical hardware that Google Cloud is running on. Google also provide many controls to help secure your applications and data.

[P] Security is a shared responsibility though. The way you configure your networks, storage services, and machines will determine how your application is secured. When you design your case study, you will consider its security requirements and bake them into the design.

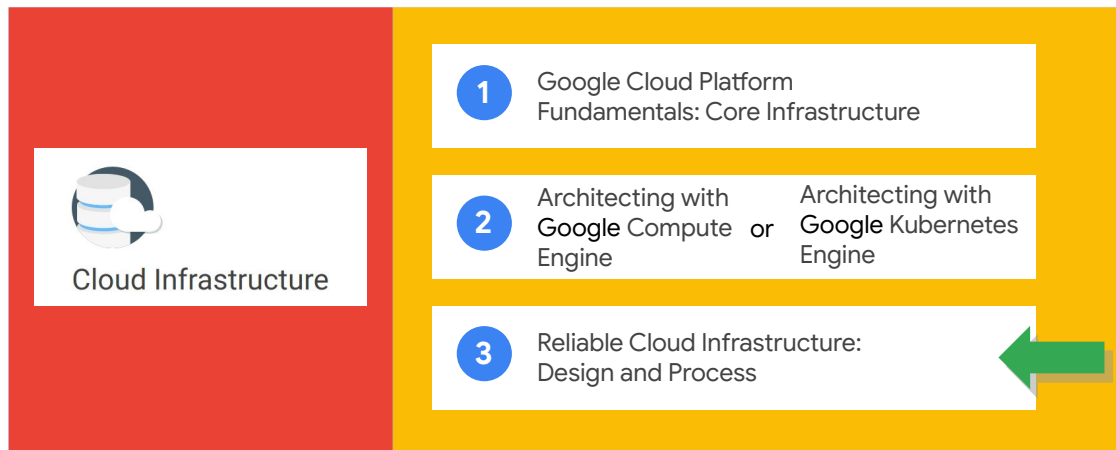
Finally, you will monitor your app to see whether you're meeting your service goals



[S] At the end, you will monitor your app to see whether you're meeting your service objectives. In Google Cloud there are many services for monitoring your applications.

[P] These include dashboards, logs, error reporting, and tracing. You start by defining your application requirements. As you develop your solution, you can use the monitoring tools to determine how successful you are at meeting your application goals.

Cloud Infrastructure learning path



[S] The “Reliable Cloud Infrastructure: Design and Process” course is a part of the Cloud Infrastructure learning path. This path is designed for IT professionals who are responsible for implementing, deploying, migrating, and maintaining applications in the cloud.

[P]The prerequisite for this course is either the Architecting with Google Compute Engine or the Architecting with Google Kubernetes Engine course.

[S] In other words, this course is not intended to be your first exposure to Google Cloud.



[P] Now, the course consists of lectures, design activities, and hands-on labs.

[S] You should spend a significant amount of time on the design and architecture assignments we will give you. As with many situations, there will be no one right answer, and typically different people come up with different solutions. Architecting systems is a matter of weighing the pros and cons of various solutions and trying to find the best solution given your requirements and constraints.

[P] Now, the more effort you put into these design activities, the more you will learn from this course.

Agenda

- | | |
|---|---|
| 1. Defining Services | 6. Deploying Applications to Google Cloud |
| 2. Microservice Design and Architecture | 7. Designing Reliable Systems |
| 3. DevOps Automation | 8. Security |
| 4. Choosing Storage Solutions | 9. Maintenance and Monitoring |
| 5. Google Cloud and Hybrid Network Architecture | |

[S] Besides this introduction module, there are nine modules in this course.

[P] First, you will analyze and design a case study application using a microservice architecture.

[S] Then, we will cover Google Cloud tools for DevOps and automation, and

[S] you will choose the appropriate storage services for your case study.

[P] After that you will learn about network design for cloud and hybrid applications and

[P] hybrid applications and learn how to choose the appropriate deployment service.

[S] We will finish by designing for reliability

[S] and security

[S] and by monitoring your applications.

Design and Process Activity Workbook

Examples:

- Online banking portal
- Ride sharing application
- Online shopping site

Sample Solution:

- Online travel portal



Slides are great for explaining concepts, but let's start working on the design activity workbook of this course. You can find the full workbook in the resources section of this course.

In this first activity, you need to come up with a case study idea. Whatever your idea is, you don't want it to be trivial. It should be a complex enough idea that designing the solution will be challenging.

For example, you might want to design an online banking portal, a ride-sharing application, or an online shopping site. These are all complex applications with many interesting design possibilities.

Now, all of these examples have been designed before. Feel free to use your imagination to come up with something that hasn't been done before. You can use something you might develop as part of your work. It's up to you.

As this course is recorded, we won't be able to provide you with specific feedback on your design.

Instead, we will provide you with a sample solution for an online travel portal application for each design activity.

Activity 1: Defining your case study

In the workbook do activities 1a and 1b.

- Come up with an interesting case study
- Write a short description
- List some main features
- List user roles



Now, part A of this activity is to come up with with an interesting case study.

For part B, write a short description and list the main features and roles of some typical users of your application.

Review Activity 1: Defining your case study

- Come up with an interesting case study
- Write a short description
- List some main features
- List user roles



In this first activity, you were asked to come up with a case study, write a short description, list some of its main features, and list some of the roles users would play while using the application.

To give you an idea of what to come up with, we'll go over our sample solution for an online travel portal application. Let's call it ClickTravel.

Description:

ClickTravel is a global travel agency that wants to build a scalable e-commerce platform to serve a global customer base

Main features:

- Travelers can search and book travel (hotels, flights, trains, cars)
- Pricing will be individualized based on customer preferences and demand
- Strong social media integration with reviews, posts, and analytics
- Suppliers (airlines, hotels, etc.) can upload inventory

Typical users:

- Customer
- Traveler
- Inventory supplier
- Manager

ClickTravel is a global travel agency that wants to build a scalable e-commerce platform to serve a global customer base. Let's go over the main features:

- Travelers can search and book travel like hotels, flights, trains and cars.
- Pricing will be individualized based on customer preferences and demand.
- There should be a strong social media integration with reviews, posts, and analytics.
- Suppliers like airlines and hotels can upload their inventory.

As for roles of typical users, we envision:

- A customer
- A traveler
- An inventory supplier
- And a manager

I'm sure we could come up with more features and roles, but this gives us a good feel for the application we would like to build. Now we can get started working on more detailed requirements and a design.