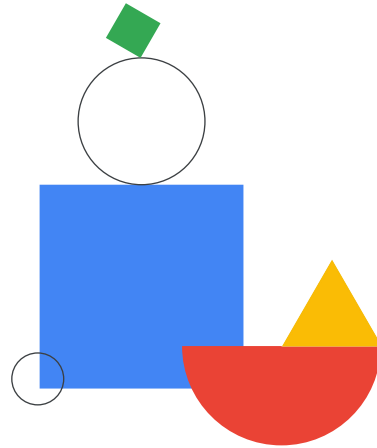


Architecting with Google Compute Engine



Welcome to Architecting with Google Compute Engine!

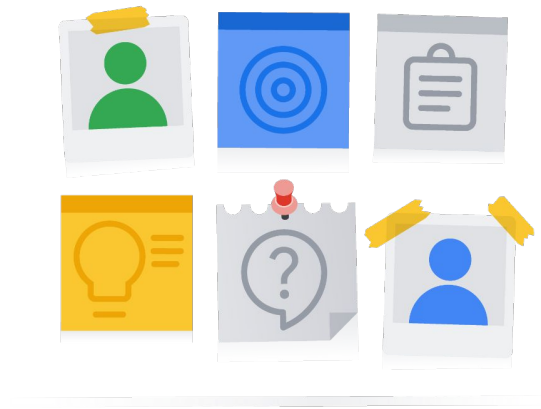
Introduction

Your instructor and you

Background

Position

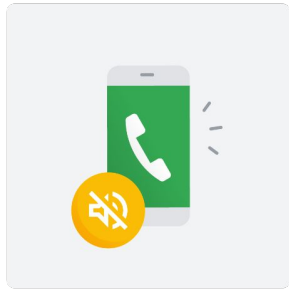
Organization



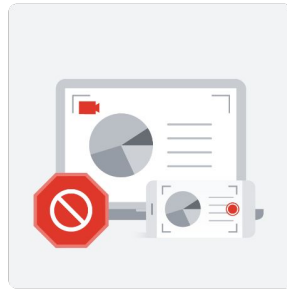
Introductions:

- Your instructor + You
- Background
- Position
- Organization

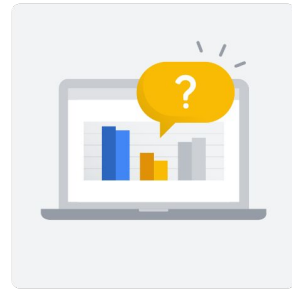
Etiquette



No calls

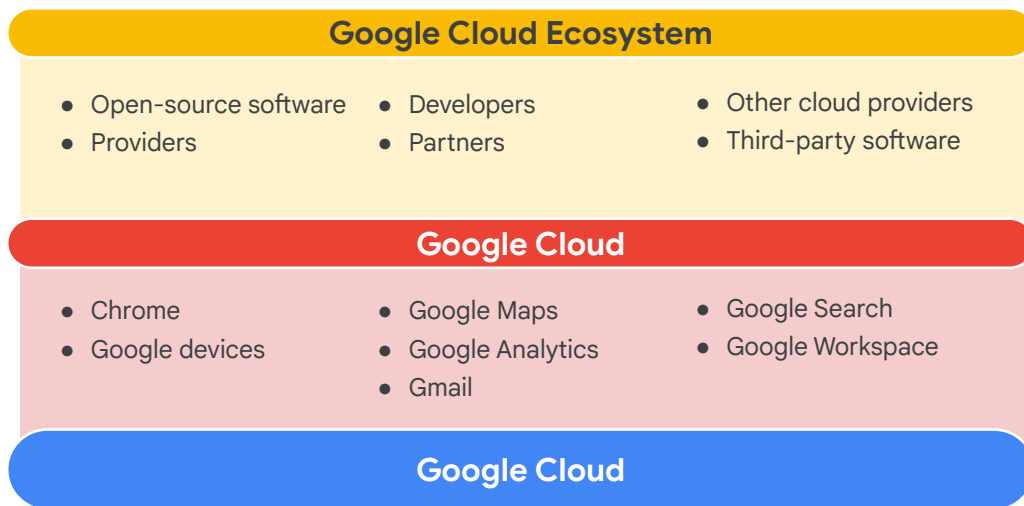


No recording



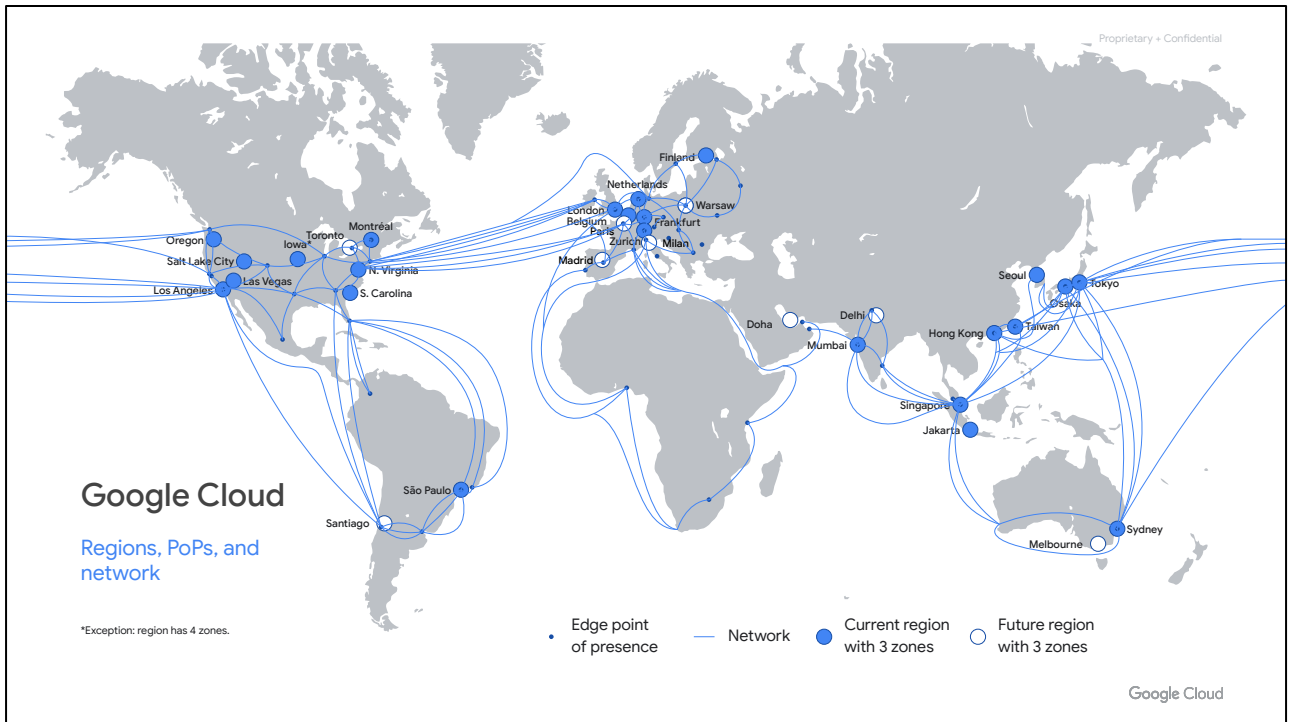
Ask questions

ILT



When you look at Google Cloud, you'll see that it's actually part of a much larger ecosystem. This ecosystem consists of open-source software, providers, partners, developers, third-party software, and other cloud providers. Google is actually a very strong supporter of open-source software.

Now Google Cloud consists of Chrome, Google Devices, Google Maps, Gmail, Google Analytics, Google Workspace, Google Search and the Google Cloud. Google Cloud itself is a computing solution platform that really encompasses three core features: infrastructure, platform, and software.



This map represents Google Cloud's global infrastructure. On a high level, Google Cloud consists of regions, which are the icons in blue; points of presence or PoPs, which are the dots in blue; a global private network, which is represented by the blue lines; and services.

Google Cloud's well-provisioned global network connects over 60 zones to over 130 points of presence through a global network of fiber optic cables. Google is continuously investing in this network, with new regions, points of presence, and subsea cable investments.

Google Cloud is...



Google Cloud

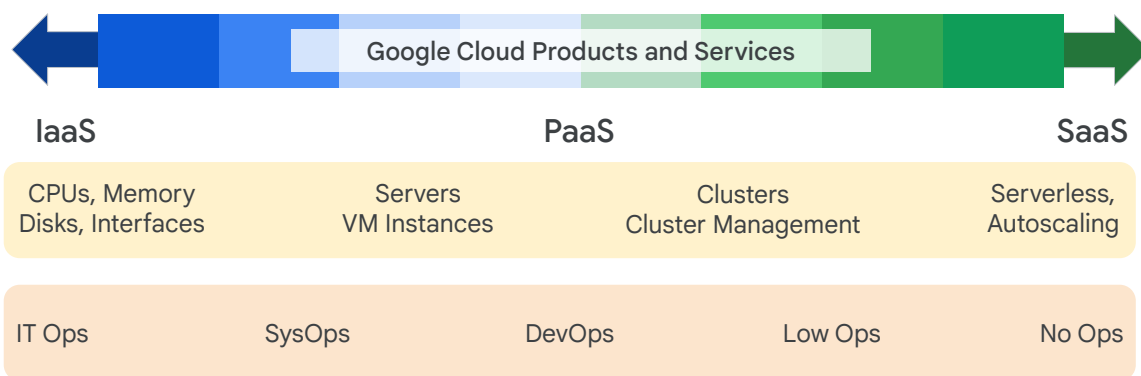
On top of this infrastructure, Google Cloud uses state-of-the-art software-defined networking and distributed systems technologies to host and deliver your services around the world. These technologies are represented by a suite of cloud-based products and services that is continuously expanding. Many of the products and services are represented by unique blue hexagonal logos, such as the ones shown here.

Google Cloud is...



Now, it's important to understand that there is usually more than one solution for a task or application in Google Cloud. To better understand this, let's look at a solution continuum.

Solution continuum

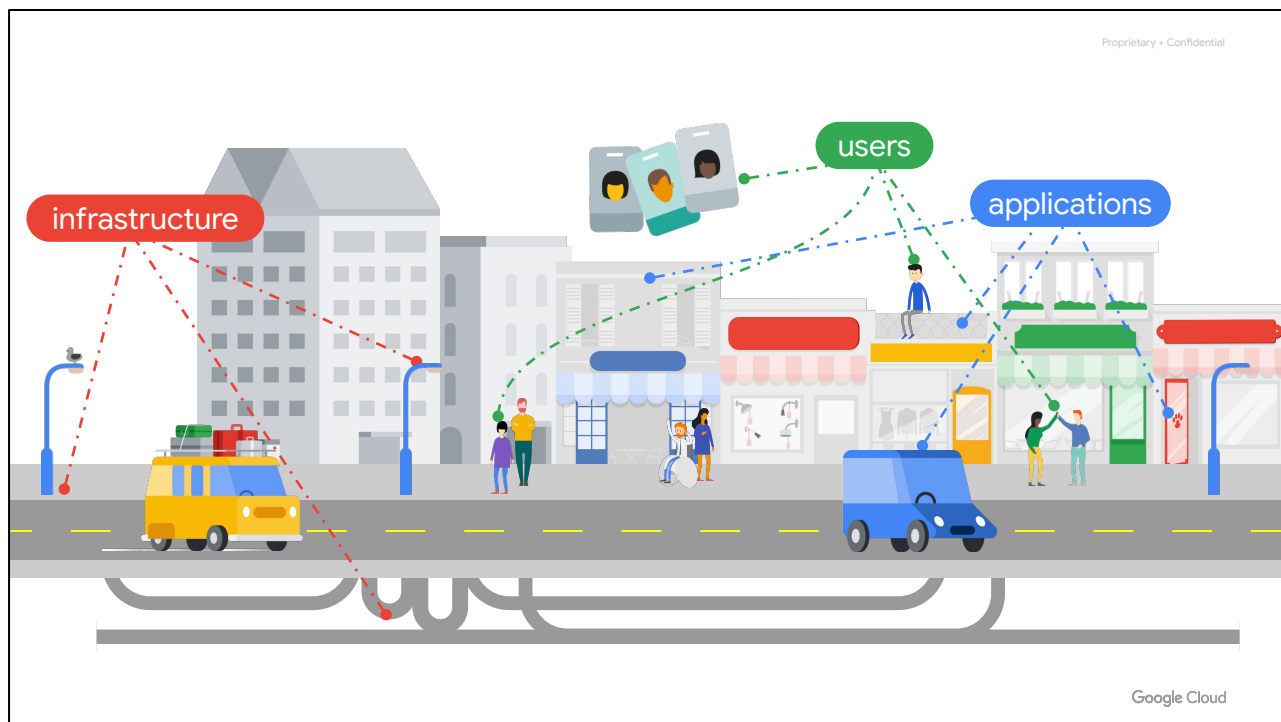


Google Cloud spans from Infrastructure as a Service (or IaaS) to Software as a Service (or SaaS). You really can build applications on Google Cloud for the web or mobile that are global, autoscaling, and assistive, and that provide services where the infrastructure is completely invisible to the user. It is not just that Google has opened the infrastructure that powers applications like Search, Gmail, Google Maps, and Google Workspace. Google has opened all of the services that make these products possible and packaged them for your use.

Alternative solutions are possible. For example, you could start up your own VM in Google Compute Engine, install open source MySQL on it, and run it just like a MySQL database on your own computer in a data center.

Or you could use the Cloud SQL service, which provides a MySQL instance and handles operational work like backups and security patching for you, using the same services Google does to automate backups and patches.

You could even move to a noSQL database that is autoscaling and serverless so that growth no longer requires adding server instances or possibly changing the design to handle the new capacity.



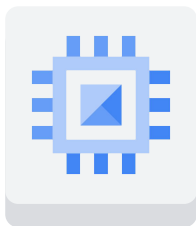
This course focuses on the infrastructure. An IT infrastructure is like a "city infrastructure." The infrastructure is the basic underlying framework of fundamental facilities and systems such as transport, communications, power, water, fuel, and other essential services.

The people in the city are like "users," and the cars and bikes and buildings in the city are like "applications." Everything that goes into creating and supporting those applications for the users is the infrastructure.

The purpose of this course is to explore, as efficiently and clearly as possible, the infrastructure services provided by Google Cloud. You should become familiar enough with the infrastructure services that you will know what the services do and how to use them.

We won't go into very deep-dive case studies on specific vertical applications, but you'll know enough to put all the building blocks together to build your own solution.

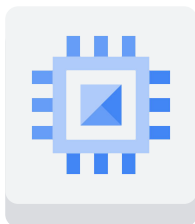
Google Cloud offers a range of compute services



Compute
Engine

Now, Google Cloud offers a range of compute services. The service that might be most familiar to newcomers is Compute Engine, which lets you run virtual machines on demand in the cloud. It's Google Cloud's Infrastructure-as-a-Service solution. It provides maximum flexibility for people who prefer to manage server instances themselves.

Google Cloud offers a range of compute services



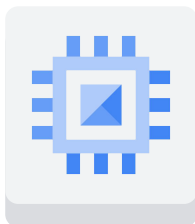
Compute
Engine



Google
Kubernetes
Engine

Google Kubernetes Engine lets you run containerized applications on a cloud environment that Google manages for you, under your administrative control. Think of containerization as a way to package code that's designed to be highly portable and to use resources very efficiently, and think of Kubernetes as a way to orchestrate code in containers. You can learn a lot more about Google Kubernetes Engine in the [Architecting with Google Kubernetes Engine](#) course.

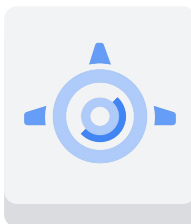
Google Cloud offers a range of compute services



Compute
Engine



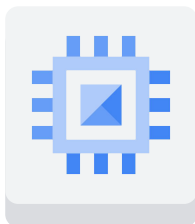
Google
Kubernetes
Engine



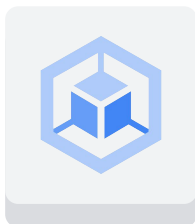
App Engine

App Engine is Google Cloud's fully managed Platform-as-a-Service framework. That means it's a way to run code in the cloud without having to worry about infrastructure. You just focus on your code, and let Google deal with all the provisioning and resource management. You can learn a lot more about App Engine in the [Developing Applications with Google Cloud](#) course.

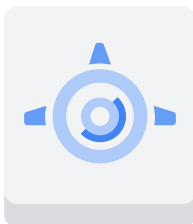
Google Cloud offers a range of compute services



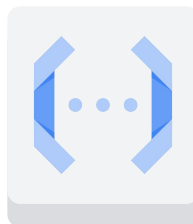
Compute
Engine



Google
Kubernetes
Engine



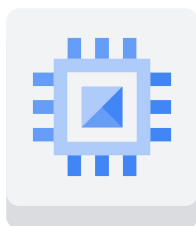
App Engine



Cloud
Functions

Cloud Functions is a completely serverless execution environment, or Functions-as-a-Service. It executes your code in response to events, whether those events occur once a day or many times per second. Google scales resources as required, but you only pay for the service while your code runs. The [Developing Applications with Google Cloud](#) course also discusses Cloud Functions.

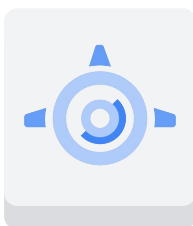
Google Cloud offers a range of compute services



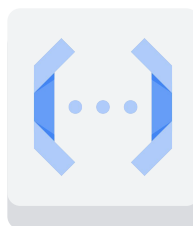
Compute
Engine



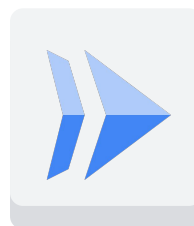
Google
Kubernetes
Engine



App Engine



Cloud
Functions



Cloud
Run

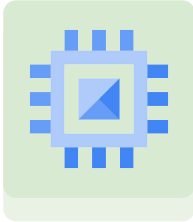
Cloud Run, a managed compute platform that lets you run stateless containers via web requests or Pub/Sub events.

Cloud Run is serverless. That means it removes all infrastructure management tasks so you can focus on developing applications.

It is built on Knative, an open API and runtime environment built on Kubernetes that gives you freedom to move your workloads across different environments and platforms. It can be fully managed on Google Cloud, on Google Kubernetes Engine, or anywhere Knative runs.

Cloud Run is fast. It can automatically scale up and down from zero almost instantaneously, and it charges you only for the resources you use, calculated down to the nearest 100 milliseconds, so you'll never pay for your over-provisioned resources.

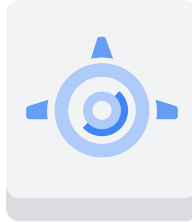
Google Cloud offers a range of compute services



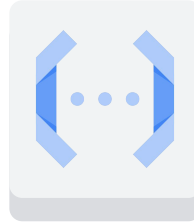
Compute
Engine



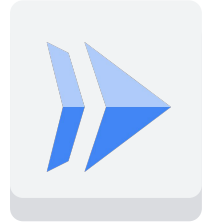
Google
Kubernetes
Engine



App Engine



Cloud
Functions



Cloud
Run

In this course, Compute Engine will be our main focus.

Cloud Infrastructure learning path



Cloud Infrastructure

Google Cloud runs on the same global infrastructure that powers YouTube, Gmail, and other Google products used by billions of people around the world. Learn about Google Cloud's approach to infrastructure and implementing, deploying, migrating, and maintaining applications.

1

Google Cloud Fundamentals:
Core Infrastructure

2

Architecting with Google
Compute Engine

3

Architecting with Google Cloud:
Design and Process

The “Architecting with Google Compute Engine” course is 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.

The prerequisite for this course is the [Google Cloud Fundamentals: Core Infrastructure](#) course.



Day 1 agenda: Foundation



01

Introduction to Google Cloud

Lab: Console and Cloud Shell
Lab: Infrastructure Preview

02

Virtual Networks

Lab: VPC Networking
Lab: Implement Private Google Access and Cloud NAT

03


Virtual Machines

Lab: Creating Virtual Machines
Lab: Working with Virtual Machines


This course is broken into three parts that are roughly distributed over the three days of this course.

“**Foundation**” is the first part of the course.

- In this part, we start by introducing you to Google Cloud and how to interact with the Google Cloud console and Cloud Shell.
- Next we'll get into virtual networks, and you will create VPC networks and other networking objects.
- Then we'll take a deep dive into virtual machines, and you will create virtual machines using Compute Engine.




Day 2 agenda: Core Services




- 04 **Identity and Access Management (IAM)**
Lab: Identity and Access Management
- 05 **Data Storage Services**
Lab: Cloud Storage
Lab: Implementing Cloud SQL
- 06 **Resource Management**
Lab: Analyzing Billing Data with BigQuery
- 07 **Resource Monitoring**
Lab: Resource Monitoring

“Core Services” is the second part of the course.

- In this part, we start by talking about IAM, and you will administer Identity and Access Management for resources.
- Next, we’ll cover the different data storage services in Google Cloud, and you will implement some of those services.
- Then we’ll go over resource management, where you will manage and examine billing of Google Cloud resources.
- Lastly we’ll talk about resource monitoring, and you will monitor Google Cloud resources using Cloud Monitoring services.



Day 3 agenda: Scaling and Automation



08 Interconnecting Networks

Lab: Virtual Private Networks

09 Load Balancing and Autoscaling

Lab: Configuring an HTTP Load Balancer with Autoscaling
Lab: Configuring an Internal Load Balancer

10 Infrastructure Automation

Lab: Automating the Deployment of Infrastructure Using Terraform

11 Managed Services

Lab: N/A

“Scaling and Automation” is the last part of the course.

- In this part, we start by going over the different options to interconnect networks to enable you to connect your infrastructure to Google Cloud.
- Next we’ll go over Google Cloud’s load balancing and autoscaling services, which you will get to explore directly.
- Then we’ll cover infrastructure automation services like Terraform, so that you can automate the deployment of Google Cloud infrastructure services.
- Lastly we’ll talk about other managed services that you might want to leverage in Google Cloud.

Lab environment

For each lab, Qwiklabs offers:

- A free set of resources for a fixed amount of time
- A clean environment with permissions



Google Cloud

Qwiklabs provisions you with Google account credentials, so you can access the Google Cloud console for each lab at no cost. Specifically, for each lab, Qwiklabs offers:

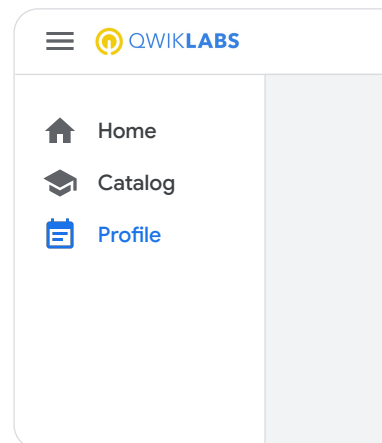
- A free set of resources for a fixed amount of time
- A clean environment with permissions

Open Qwiklabs

- 1 Open an incognito window (or private/anonymous window).
- 2 Go to the Qwiklabs URL your instructor provides.
- 3 Sign In with existing account or Join with new account (with email you used to register for the course).
- 4 Launch the course from **Profile**.

Access issues

The process to open Qwiklabs can differ based on credentials used. Please reach out to your trainer if you have any access issues.



Google Cloud

Let's go ahead and open Qwiklabs:

1. **Open an incognito window** (or private/anonymous window). Use of an incognito browser window reduces the risk that you will accidentally do the labs using your own Google Cloud account rather than Qwiklabs'.
2. **Go** to the Qwiklabs URL your instructor provides.
3. **Sign In** with existing account or **Join** with new account (with email you used to register for the course).
4. Launch the course from **Profile**.

View your labs

Do **NOT** launch a lab until instructed to do so!

The screenshot shows a user interface with two tabs: 'Labs' (selected) and 'Lecture Notes'. Below the tabs is a list of four lab entries, each represented by a circular icon, a progress bar, and a label. The first entry has a green checkmark icon and a full progress bar. The second entry has an empty circle icon and a full progress bar. The third and fourth entries have a triangle with an exclamation mark icon and a full progress bar, with a 'Lab Currently Disabled' button to the right of each. To the right of the list, three arrows point to the respective rows with labels: 'Lab completed' for the first row, 'To be completed' for the second row, and 'Not yet available' for the third and fourth rows.

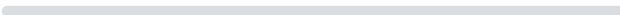







Icon	Progress Bar	Status
✓	Full	Lab completed
○	Full	To be completed
⚠	Full	Lab Currently Disabled
⚠	Full	Lab Currently Disabled

After you launch the course, you can view your labs. The lab list will indicate if a lab is:

- Completed (by you)
- Active
- Or not yet available

Your instructor will let you know when it's time to launch a lab. Once you start a lab, you won't be able to pause and restart it, so you'll need a continuous block of time to complete the work.

View lecture notes

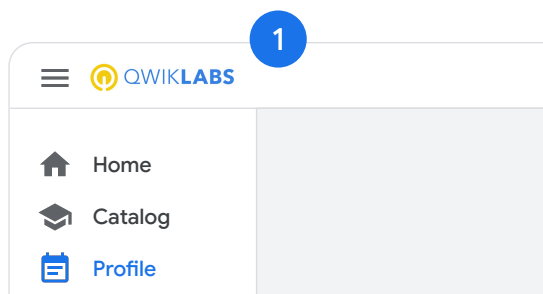
Labs	Lecture Notes
01	 
02	 
03	 
04	 

You can download
these as PDF files

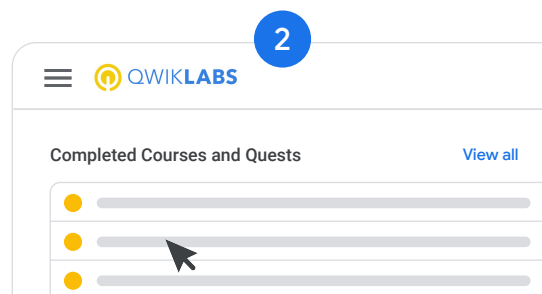
Within the course, you can also view the lecture notes. You can download these as PDF files.

End of class - Materials

Materials are available for 2 years



Click on **Profile** in the left-hand navigation bar



Select the class from the **Completed Courses** list

You can view the course materials within Qwiklabs as follows:

1. Click on **Profile** in the left-hand navigation bar.
2. Scroll down to the **Completed Courses** section.
3. Select the class from the **Completed Courses** list.

Materials are available for 2 years following the completion of a course.

