

# Regions and zones

Compute Engine resources are hosted in multiple locations worldwide. These locations are composed of regions and zones. A region is a specific geographical location where you can host your resources. Regions have three or more zones. For example, the `us-west1` region denotes a region on the west coast of the United States that has three zones: `us-west1-a`, `us-west1-b`, and `us-west1-c`.

Resources that live in a zone, such as [virtual machine instances](/compute/docs/instances) (`/compute/docs/instances`) or zonal [persistent disks](/compute/docs/disks) (`/compute/docs/disks`), are referred to as zonal resources. Other resources, like [static external IP addresses](/compute/docs/ip-addresses#reservedaddress) (`/compute/docs/ip-addresses#reservedaddress`), are regional. Regional resources can be used by any resource in that region, regardless of zone, while zonal resources can only be used by other resources in the same zone.

For example, to attach a zonal persistent disk to an instance, both resources must be in the same zone. Similarly, if you want to assign a static IP address to an instance, the instance must be in the same region as the static IP address.

Putting resources in different zones in a region reduces the risk of an infrastructure outage affecting all resources simultaneously. Putting resources in different regions provides an even higher degree of failure independence. This lets you design robust systems with resources spread across different failure domains.

Only certain resources are region- or zone-specific. Other resources, such as images, are global resources that can be used by any other resources across any location. For information on global, regional, and zonal Compute Engine resources, see [Global, Regional, and Zonal Resources](/compute/docs/regions-zones/global-regional-zonal-resources) (`/compute/docs/regions-zones/global-regional-zonal-resources`).

## Zones and clusters

Compute Engine implements a layer of abstraction between zones and the physical clusters where the zones are hosted. A cluster represents a distinct physical infrastructure that is housed in a data center. Each zone is hosted in one or more clusters and Compute Engine independently maps zones to clusters for each organization. For example, the `us-central1-a` zone for your organization might not map to the same cluster as the `us-central1-a` zone for another organization.

Read the [Zone virtualization](/compute/docs/regions-zones/zone-virtualization) (`/compute/docs/regions-zones/zone-virtualization`) document to learn more about zone-to-cluster mapping and zone virtualization concepts.

Decoupling zones from clusters provides a number of benefits to you and to Compute Engine:

- It allows Compute Engine to ensure resources are balanced across the clusters in a region.
- The list of zones you can choose from remains manageable as Compute Engine continues to grow its regions over time by adding more clusters.

For most organizations, Compute Engine ensures that all projects in an organization have a consistent zone to cluster mapping. For organizations with projects that use [VPC Network Peering](/vpc/docs/vpc-peering) (/vpc/docs/vpc-peering) or [Private services access](/vpc/docs/private-services-access) (/vpc/docs/private-services-access) to share networks or services with other organizations, Compute Engine tries to ensure that the peered organizations all have a consistent zone to cluster mapping. In the case of large-scale SaaS providers, for example, Compute Engine might not provide a consistent mapping for all peered organizations. In these cases, Compute Engine ensures that the peered projects have a consistent zone to cluster mapping.

## Choosing a region and zone

You choose which region or zone hosts your resources, which controls where your data is stored and used. Choosing a region and zone is important for several reasons:

### Handling failures

Distribute your resources across multiple zones and regions to tolerate outages. Google designs zones to minimize the risk of correlated failures caused by physical infrastructure outages like power, cooling, or networking. Thus, if a zone becomes unavailable, you can transfer traffic to another zone in the same region to keep your services running. Similarly, you can mitigate the impact of a region outage on your application by running backup services in a different region. For more information about distributing your resources and designing a robust system, see [Designing Robust Systems](/compute/docs/robustsystems) (/compute/docs/robustsystems).

### Decreased network latency

To decrease network latency, you might want to choose a region or zone that is close to your point of service. For example, if you mostly have customers on the East Coast of the US, then you might want to choose a primary region and zone that is close to that area and a backup region and zone that is also close by.

For more information about how to choose a region and zone for your Compute Engine resources, see [Best practices for Compute Engine regions selection](/solutions/best-practices-compute-engine-region-selection) (/solutions/best-practices-compute-engine-region-selection).

## Identifying a region or zone

Each region in Compute Engine contains a number of zones. Each zone name contains two parts that describe each zone in detail. The first part of the zone name is the **region** and the second part of the name describes the **zone** in the region:

- **Region**

*Regions* are collections of zones. Zones have high-bandwidth, low-latency network connections to other zones in the same region. In order to deploy fault-tolerant applications that have high availability, Google recommends deploying applications across multiple zones and multiple regions. This helps protect against unexpected failures of components, up to and including a single zone or region.

Choose regions that makes sense for your scenario. For example, if you only have customers in the US, or if you have specific needs that require your data to live in the US, it makes sense to store your resources in zones in the `us-central1` region or zones in the `us-east1` region.

- **Zone**

A *zone* is a deployment area within a region. The fully-qualified name for a zone is made up of `<region>-<zone>`. For example, the fully qualified name for zone `a` in region `us-central1` is `us-central1-a`.

Depending on how widely you want to distribute your resources, create instances across multiple zones in multiple regions for redundancy.

## Available regions and zones

You can use the Google Cloud console, the Google Cloud CLI, or REST to [see available regions and zones](/compute/docs/regions-zones/viewing-regions-zones) (/compute/docs/regions-zones/viewing-regions-zones). You can also use the `gcloud compute machine-types list` command (/sdk/gcloud/reference/compute/machine-types/list) to get a complete list of available machine types in all regions and zones. For example, `gcloud compute machine-types list --`

`filter="name=t2d-standard-4"` displays all the regions and zones where `t2d-standard-4` machine types are available.

Each zone offers a variety of processors. When you create an instance in a zone, your instance uses the default processor supported in that zone. For example, if you create an instance in the `us-central1-a` zone, your instance by default uses an Intel Haswell processor, unless you specify another option.

Alternatively, you can choose your desired CPU platform. For more information, read [Specifying a minimum CPU platform for VM instances](/compute/docs/instances/specify-min-cpu-platform) (`/compute/docs/instances/specify-min-cpu-platform`).

Contact your account team to request access to a machine family in a specific region or zone.

The following sortable table lets you select different options to see where resources are available. For example, you can select **Europe** from the **Select a location** drop-down menu, and **M2** from the **Select a machine type** drop-down menu to see a list of zones where M2 machines are available in Europe.

**Note:** [Local SSDs](/compute/docs/disks#localssds) (`/compute/docs/disks#localssds`) are available in all regions and zones. [GPUs](/compute/docs/gpus/gpu-regions-zones) (`/compute/docs/gpus/gpu-regions-zones`) are available only in specific zones. [Sole-tenancy](/compute/docs/nodes) (`/compute/docs/nodes`) is available in regions and zones where machine series with [sole-tenant node types](/compute/docs/nodes/sole-tenant-nodes#node_types) (`/compute/docs/nodes/sole-tenant-nodes#node_types`) are available.

For information about hardware and feature support for all machine series, see [Machine series comparison](https://cloud.google.com/compute/docs/machine-resource#machine_type_comparison) (`https://cloud.google.com/compute/docs/machine-resource#machine_type_comparison`). For example, to see which machine series support both local SSDs and sole tenancy, in the **Choose VM properties to compare** field, select both **Local SSD** and **Sole tenancy**.

Select a location ▼

Select a machine type ▼

Select a CPU ▼

Select other resources ▼

Clear all

Zones ▼	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
asia-east1-a	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-east1-b	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, M3, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-east1-c	Changhua County, Taiwan, APAC	E2, N2, N2D, T2D, N1, M1, M3, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-east2-a	Hong Kong, APAC	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-east2-b	Hong Kong, APAC	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome,		

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			AMD EPYC Milan		
asia-east2-c	Hong Kong, APAC	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-northeast1-a	Tokyo, Japan, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-northeast1-b	Tokyo, Japan, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-northeast1-c	Tokyo, Japan, APAC	E2, N2, N2D, T2D, N1, M1, C2, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
asia-northeast2-a	Osaka, Japan, APAC	E2, N2, N2D, T2D, N1, M1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-northeast2-b	Osaka, Japan, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-northeast2-c	Osaka, Japan, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-northeast3-a	Seoul, South Korea, APAC	E2, N2, N2D, N1, M1, M2, C2, A2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-northeast3-b	Seoul, South Korea, APAC	E2, N2, N1, M1, M2, C2, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Cascade Lake, Ice Lake		
<b>asia-northeast3-c</b>	Seoul, South Korea, APAC	E2, N2, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake	GPUs	
<b>asia-south1-a</b>	Mumbai, India, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>asia-south1-b</b>	Mumbai, India, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>asia-south1-c</b>	Mumbai, India, APAC	E2, N2, N2D, T2D, N1, M1, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>asia-south2-a</b>	Delhi, India, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Haswell, Broadwell, Skylake,		




Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-south2-b	Delhi, India, APAC	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-south2-c	Delhi, India, APAC	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan		
asia-southeast1-a	Jurong West, Singapore, APAC	E2, N2, N2D, C3, C3D, T2D, N1, M1, M3, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	
asia-southeast1-b	Jurong West, Singapore, APAC	E2, N2, N2D, C3, C3D, T2D, T2A, N1, M1, M3, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Ampere Altra Arm		
asia-southeast1-c	Jurong West, Singapore, APAC	E2, N2, N2D, C3, C3D, T2D, T2A, N1, M1, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Ampere Altra Arm	GPUs	
asia-southeast2-a	Jakarta, Indonesia, APAC	E2, N2, N2D, T2D, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-southeast2-b	Jakarta, Indonesia, APAC	E2, N2, N2D, T2D, N1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
asia-southeast2-c	Jakarta, Indonesia, APAC	E2, N2, N2D, T2D, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake,	GPUs	



Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>australia-southeast1-a</b>	Sydney, Australia, APAC	E2, N2, N2D, T2D, N1, C2, M1, M2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>australia-southeast1-b</b>	Sydney, Australia, APAC	E2, N2, N2D, T2D, N1, C2, M1, M2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>australia-southeast1-c</b>	Sydney, Australia, APAC	E2, N2, N2D, T2D, N1, C2, M1	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>australia-southeast2-a</b>	Melbourne, Australia, APAC	E2, N2, N2D, T2D, N1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome,		

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			AMD EPYC Milan		
<b>australia-southeast2-b</b>	Melbourne, Australia, APAC	E2, N2, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake		
<b>australia-southeast2-c</b>	Melbourne, Australia, APAC	E2, N2, N2D, T2D, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>europa-central2-a</b>	Warsaw, Poland, Europe	E2, N2, N2D, T2D, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>europa-central2-b</b>	Warsaw, Poland, Europe	E2, N2, N2D, T2D, N1, M1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>europa-central2-c</b>	Warsaw, Poland, Europe	E2, N2, N2D, T2D, N1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome,	GPUs	


Zones	Location	Machine types	CPUs	ResourcesCO <sub>2</sub> emissions
			AMD EPYC Milan	
europa-north1-a	Hamina, Finland, Europe	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-north1-b	Hamina, Finland, Europe	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-north1-c	Hamina, Finland, Europe	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-southwest1-a	Madrid, Spain, Europe	E2, N2, N2D, T2D, M1, M3	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-southwest1-b	Madrid, Spain, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	


Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
europa-southwest1-c	Madrid, Spain, Europe	E2, N2, N2D, T2D, M1, M3	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
europa-west1-b	St. Ghislain, Belgium, Europe	E2, N2, N2D, C3, C3D, T2D, N1, M1, M2, M3, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west1-c	St. Ghislain, Belgium, Europe	E2, N2, N2D, C3, C3D, T2D, N1, M2, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west1-d	St. Ghislain, Belgium, Europe	E2, N2, N2D, C3, C3D, T2D, N1, M1, M2, M3, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)




Zones	Location	Machine types	CPUs	ResourcesCO <sub>2</sub> emissions
			EPYC Milan, AMD EPYC Genoa	
europa-west10-a	Berlin, Germany, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-west10-b	Berlin, Germany, Europe	E2, N2, N2D, T2D	Intel Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-west10-c	Berlin, Germany, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-west12-a	Turin, Italy, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-west12-b	Turin, Italy, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	
europa-west12-c	Turin, Italy, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
<b>europe-west2-a</b>	London, England, Europe	E2, N2, N2D, T2D, N1, M1, M2, C2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
<b>europe-west2-b</b>	London, England, Europe	E2, N2, N2D, T2D, N1, M1, M2, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
<b>europe-west2-c</b>	London, England, Europe	E2, N2, N2D, T2D, N1, M1, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		 <u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
<b>europe-west3-a</b>	Frankfurt, Germany, Europe	E2, N2, N2D, T2D, N1, M1, M2, M3, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		 <u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
<b>europe-west3-b</b>	Frankfurt, Germany, Europe	E2, N2, N2D, T2D, N1, M1,	Intel Ivy Bridge, Sandy Bridge,	GPUs	









Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
		M2, M3, C2, C2D, G2	Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		<u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
europa-west3-c	Frankfurt, Germany, Europe	E2, N2, N2D, T2D, N1, M1, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		 <u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
europa-west4-a	Eemshaven, Netherlands, Europe	E2, N2, N2D, C3, C3D, T2D, T2A, N1, M1, M2, M3, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Ampere Altra Arm	GPUs	
europa-west4-b	Eemshaven, Netherlands, Europe	E2, N2, N2D, C3, T2D, T2A, N1, M1, M2, M3, H3, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC	GPUs	







Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Genoa, Ampere Altra Arm		
europa-west4-c	Eemshaven, Netherlands, Europe	E2, N2, N2D, C3, Intel Ivy Bridge, C3D, T2D, T2A, N1, M1, M2, C2, C2D, G2	Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Ampere Altra Arm	GPUs	
europa-west6-a	Zurich, Switzerland, Europe	E2, N2, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west6-b	Zurich, Switzerland, Europe	E2, N2, N2D, T2D, N1, M1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west6-c	Zurich, Switzerland, Europe	E2, N2, N2D, T2D, N1, M1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome,		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)




Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			AMD EPYC Milan		
europa-west8-a	Milan, Italy, Europe	E2, N2, N2D, T2D, M1, M2, M3	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
europa-west8-b	Milan, Italy, Europe	E2, N2, N2D, T2D	Intel Broadwell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan		
europa-west8-c	Milan, Italy, Europe	E2, N2, N2D, T2D, M1, M2, M3	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
europa-west9-a	Paris, France, Europe	E2, N2, N2D, T2D, M3	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		<a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west9-b	Paris, France, Europe	E2, N2, N2D, T2D, M1	Intel Broadwell, Haswell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		<a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
europa-west9-c	Paris, France, Europe	E2, N2, N2D, T2D, M1	Intel Broadwell, Haswell, Skylake, Cascade Lake,		<a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)

Zones	Location	Machine types	CPUs	ResourcesCO <sub>2</sub> emissions
			Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
me-central1-a	Doha, Qatar, Middle East	E2, N2	Intel Broadwell, Skylake, Cascade Lake, Ice Lake	
me-central1-b	Doha, Qatar, Middle East	E2, N2, N2D, T2D, M3	Intel Broadwell, Ivy Bridge, Skylake, Cascade Lake, Ice Lake, AMD Rome, AMD, Milan	
me-central1-c	Doha, Qatar, Middle East	E2, N2, N2D, T2D, M3	Intel Broadwell, Ivy Bridge, Skylake, Cascade Lake, Ice Lake, AMD Rome, AMD, Milan	
me-central2-a	Dammam, Saudi Arabia, Middle East	E2, N2, N2D, T2D, M3	Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
me-central2-b	Dammam, Saudi Arabia, Middle East	E2, N2, N2D, T2D	Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
me-central2-c	Dammam, Saudi Arabia, Middle East	E2, N2, N2D, T2D, M3	Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	
me-west1-a	Tel Aviv, Israel, Middle East	E2, N2, N2D, T2D, M1, C2	Intel Broadwell, Skylake, Cascade Lake,	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
me-west1-b	Tel Aviv, Israel, Middle East	E2, N2, N2D, T2D, C2, A2	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
me-west1-c	Tel Aviv, Israel, Middle East	E2, N2, N2D, T2D, M1, C2, A2	Intel Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
northamerica-northeast1-a	Montréal, Québec, North America	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
northamerica-northeast1-b	Montréal, Québec, North America	E2, N2, N2D, T2D, N1, M1, M2, M3, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
northamerica-northeast1-c	Montréal, Québec, North America	E2, N2, N2D, T2D, N1, M1, M2, M3, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell,	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
northamerica-northeast2-a	Toronto, Ontario, North America	E2, N2, N1, M1, M2, M3	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
northamerica-northeast2-b	Toronto, Ontario, North America	E2, N2, N1, M1, M2, M3	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
northamerica-northeast2-c	Toronto, Ontario, North America	E2, N2, N1	Intel Ivy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
southamerica-east1-a	Osasco, São Paulo, Brazil, South America	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
southamerica-east1-b	Osasco, São Paulo, Brazil, South America	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome,		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)




Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			AMD EPYC Milan		
<b>southamerica-east1-c</b>	Osasco, São Paulo, Brazil, South America	E2, N2, N2D, T2D, N1, M1, M2, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
<b>southamerica-west1-a</b>	Santiago, Chile, South America	E2, N2, C2	Intel Broadwell, Haswell, Skylake, Cascade Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
<b>southamerica-west1-b</b>	Santiago, Chile, South America	E2, N2, M1, M2, C2	Intel Broadwell, Haswell, Skylake, Cascade Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
<b>southamerica-west1-c</b>	Santiago, Chile, South America	E2, N2, M1, M2, C2	Intel Broadwell, Haswell, Skylake, Cascade Lake		 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
<b>us-central1-a</b>	Council Bluffs, Iowa, North America	E2, N2, N2D, C3, C3D, T2D, T2A, N1, M1, M2, M3, H3, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Ampere Altra Arm	GPUs	 <a href="#">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
<b>us-central1-b</b>	Council Bluffs, Iowa, North America	E2, N2, N2D, C3, C3D, T2D, T2A,	Intel Ivy Bridge, Sandy Bridge, Haswell,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
		N1, M1, M2, M3, C2, C2D, A2, G2	Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa, Sapphire Rapids, Ampere Altra Arm		 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
us-central1-c	Council Bluffs, Iowa, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, M2, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
us-central1-f	Council Bluffs, Iowa, North America	E2, N2, N2D, T2D, T2A, N1, M1, M3, C2, C2D, A2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan, Ampere Altra Arm	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
us-east1-b	Moncks Corner, South Carolina, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, M3, C2, C2D, A2, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC	GPUs	



Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Rome, AMD EPYC Milan, AMD EPYC Genoa		
<b>us-east1-c</b>	Moncks Corner, South Carolina, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	
<b>us-east1-d</b>	Moncks Corner, South Carolina, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	
<b>us-east4-a</b>	Ashburn, Virginia, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, M2, M3, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
<b>us-east4-b</b>	Ashburn, Virginia, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, M2, M3, C2, C2D	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	
<b>us-east4-c</b>	Ashburn, Virginia, North America	E2, N2, N2D, C3, C3D, T2D, N1, M1, C2, C2D, A2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan, AMD EPYC Genoa	GPUs	
<b>us-east5-a</b>	Columbus, Ohio, North America	E2, N2, N2D, T2D, C2, C3	Intel Broadwell, Haswell, Skylake, Cascade Lake, Ice Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan		
<b>us-east5-b</b>	Columbus, Ohio, North America	E2, N2, N2D, T2D, C2, C3	Intel Broadwell, Haswell, Skylake, Cascade Lake, Sapphire Rapids, AMD EPYC Rome, AMD EPYC Milan	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
us-east5-c	Columbus, Ohio, North America	E2, N2, N2D, T2D, C2	Intel Broadwell, Haswell, Skylake, Cascade Lake, AMD EPYC Rome, AMD EPYC Milan		
us-south1-a	Dallas, Texas, North America	E2, N2	Intel Broadwell, Haswell, Skylake, Cascade Lake		
us-south1-b	Dallas, Texas, North America	E2, N2	Intel Broadwell, Haswell, Skylake, Cascade Lake		
us-south1-c	Dallas, Texas, North America	E2, N2	Intel Broadwell, Haswell, Skylake, Cascade Lake		
us-west1-a	The Dalles, Oregon, North America	E2, N2, N2D, T2D, N1, M1, C2, C2D, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
us-west1-b	The Dalles, Oregon, North America	E2, N2, N2D, T2D, N1, C2, C2D, M1, G2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	 <a href="/sustainability/region-carbon">Low CO<sub>2</sub></a> (/sustainability/region-carbon)
us-west1-c	The Dalles, Oregon, North America	E2, N2, N2D, T2D, N1, C2,	Intel Ivy Bridge, Sandy Bridge,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
	America	C2D, G2	Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		<u>Low CO<sub>2</sub></u> (/sustainability/region-carbon)
us-west2-a	Los Angeles, California, North America	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
us-west2-b	Los Angeles, California, North America	E2, N2, N2D, T2D, N1, M1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
us-west2-c	Los Angeles, California, North America	E2, N2, N2D, N1, M1, C2	Intel Ivy Bridge, Sandy Bridge, Haswell, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
us-west3-a	Salt Lake City, Utah, North America	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake,		

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>us-west3-b</b>	Salt Lake City, Utah, North America	E2, N2, N2D, T2D, N1, C2, A2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>us-west3-c</b>	Salt Lake City, Utah, North America	E2, N2, N2D, T2D, N1, C2	Intel Ivy Bridge, Sandy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan		
<b>us-west4-a</b>	Las Vegas, Nevada, North America	E2, N2, N2D, T2D, N1, C2, M1, M2, M3, G2	Intel Ivy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>us-west4-b</b>	Las Vegas, Nevada, North America	E2, N2, N2D, N1, C2, T2D, M1, M2, M3, A2	Intel Ivy Bridge, Broadwell, Skylake, Cascade Lake, Ice Lake, AMD EPYC Rome, AMD EPYC Milan	GPUs	
<b>us-west4-c</b>	Las Vegas, Nevada, North America	E2, N2, N2D, T2D, N1, C2, G2	Intel Ivy Bridge, Broadwell, Skylake, Cascade Lake,	GPUs	

Zones	Location	Machine types	CPUs	Resources	CO <sub>2</sub> emissions
			Ice Lake, AMD EPYC Rome, AMD EPYC Milan		

## Transparent maintenance

Google regularly maintains its infrastructure by patching systems with the latest software, performing routine tests and preventative maintenance, and generally ensuring that Google infrastructure is as fast and efficient as Google knows how to make it.

By default, all instances are configured so that these maintenance events are transparent to your applications and workloads. Google uses a combination of datacenter innovations, operational best practices, and live migration technology to move running virtual machine instances out of the way of maintenance that is being performed. Your instance continues to run within the same zone with no action on your part.

By default, all virtual machines are set to live migrate, but you can also set your virtual machines to stop and reboot. The two options differ in the following ways:

- **Live migrate**

Compute Engine automatically migrates your running instance. The migration process will impact guest performance to some degree but your instance remains online throughout the migration process. The exact guest performance impact and duration depends on many factors, but it is expected most applications and workloads will not notice. For more information, see [Live Migration](#) (/compute/docs/instances/live-migration-process).

- **Stop and reboot**

Compute Engine automatically signals your instance to shut down, waits a short time for it to shut down cleanly, and then restarts it away from the maintenance event.

For more information on how to set the options above for your instances, see [Set VM host maintenance policy](#) (/compute/docs/instances/host-maintenance-options).

## Quotas

Certain resources, such as static IPs, images, firewall rules, and VPC networks, have defined project-wide quota limits and per-region quota limits. When you create these resources, it counts towards your total project-wide quota or your per-region quota, if applicable. If any of the affected quota limits are exceeded, you won't be able to add more resources of the same type in that project or region.

To see a comprehensive list of quotas that apply to your project, visit the [Quotas](https://console.cloud.google.com/iam-admin/quotas) (<https://console.cloud.google.com/iam-admin/quotas>) page in the Google Cloud console.

For example, if your global target pools quota is 50 and you create 25 target pools in example-region-1 and 25 target pools in example-region-2, you reach your project-wide quota and won't be able to create more target pools in any region within your project until you free up space. Similarly, if you have a per-region quota of 7 reserved IP addresses, you can only reserve up to 7 IP addresses in a single region. After you reach that limit, you will either need to reserve IP addresses in a new region or release some IP addresses.

## Location selection tips

During VM instance creation, Compute Engine can automatically select zones for your instances based on capacity and availability using the following methods:

- The [bulk instance creation API](#) (/compute/docs/instances/using-bulk-api) can automatically choose the zone in which to create instances.
- A regional managed instance group (MIG) can be configured with a [target distribution shape](#) (/compute/docs/instance-groups/regional-mig-set-target-distribution-shape), which can automatically create instances in zones where resources are available.

When selecting zones yourself, here are some things to keep in mind:

- **Communication within and across regions will incur different costs.**

Generally, communication within regions will always be cheaper and faster than communication across different regions.

- **Design important systems with redundancy across multiple zones or regions.**

At some point in time, your instances might experience an unexpected failure. To mitigate the effects of these possible events, you should duplicate important systems in multiple zones and regions.

For example, by hosting instances in zones `eu-west1-b` and `eu-west1-c`, if `eu-west1-b` fails unexpectedly, your instances in zone `eu-west1-c` will still

be available. However, if you host all your instances in `eu-west1-b`, you will not be able to access any instances if `eu-west1-b` goes offline. Also, consider hosting your resources across regions. For example, to plan for continued availability of your workload in the unlikely scenario that the `eu-west1` region experiences a failure, consider deploying the workload on backup instances in the `eu-west3` region. For more tips on how to design systems for availability, see [Designing Robust Systems](/compute/docs/robustsystems) (`/compute/docs/robustsystems`).

## What's next

- Learn how to [view available regions and zones](/compute/docs/regions-zones/viewing-regions-zones) (`/compute/docs/regions-zones/viewing-regions-zones`).
- Learn how to [change your default zone or region](/compute/docs/regions-zones/changing-default-zone-region) (`/compute/docs/regions-zones/changing-default-zone-region`).
- Learn more about [geography and zones](/docs/geography-and-regions) (`/docs/geography-and-regions`).
- Learn more about the [global, regional, and zonal resources](/compute/docs/regions-zones/global-regional-zonal-resources) (`/compute/docs/regions-zones/global-regional-zonal-resources`).

## Try it for yourself

If you're new to Google Cloud, create an account to evaluate how Compute Engine performs in real-world scenarios. New customers also get \$300 in free credits to run, test, and deploy workloads.

**Try Compute Engine free** (<https://console.cloud.google.com/freetrial>)

Except as otherwise noted, the content of this page is licensed under the [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/) (`https://creativecommons.org/licenses/by/4.0/`), and code samples are licensed under the [Apache 2.0 License](https://www.apache.org/licenses/LICENSE-2.0) (`https://www.apache.org/licenses/LICENSE-2.0`). For details, see the [Google Developers Site Policies](https://developers.google.com/site-policies) (`https://developers.google.com/site-policies`). Java is a registered trademark of Oracle and/or its affiliates.

Last updated 2023-11-27 UTC.