Security

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Solutions Developer, Google Cloud

Agenda

Course Intro

Beam and Dataflow Refresher

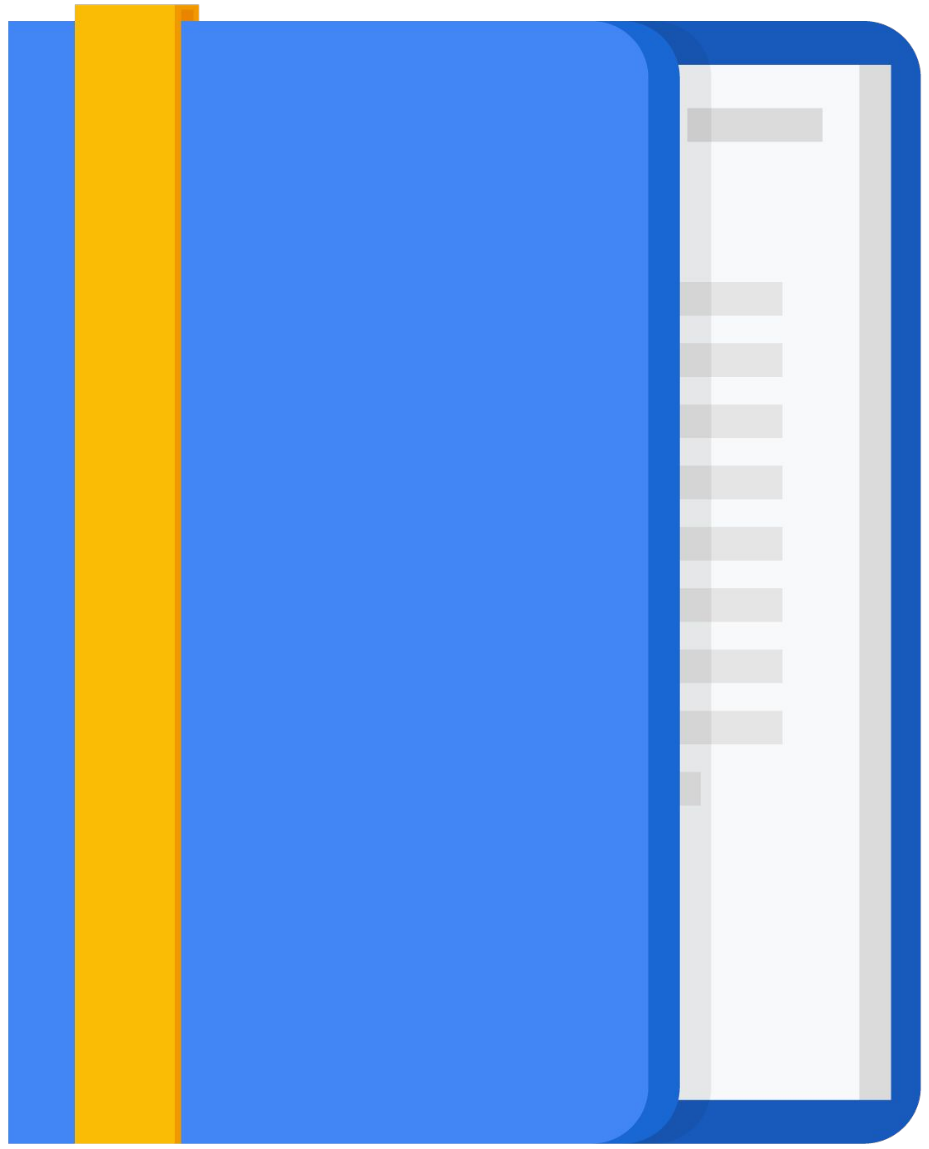
Beam Portability

Separating Compute and Storage

IAM, Quotas, and Permissions

Security

Summary



Security

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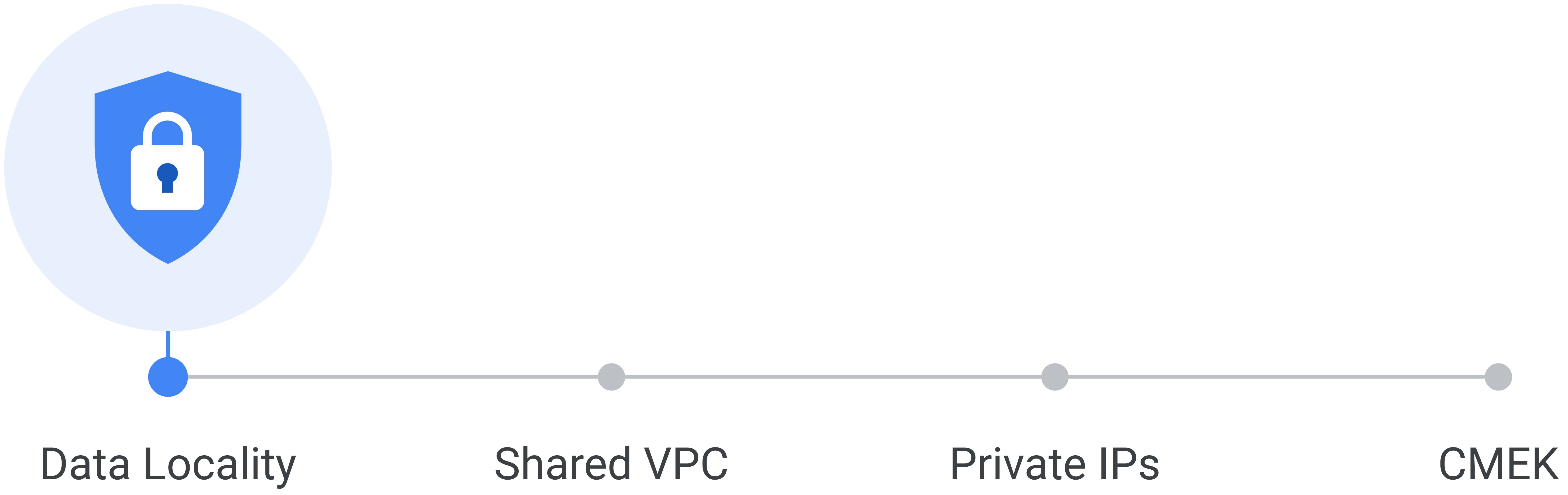


Data Locality

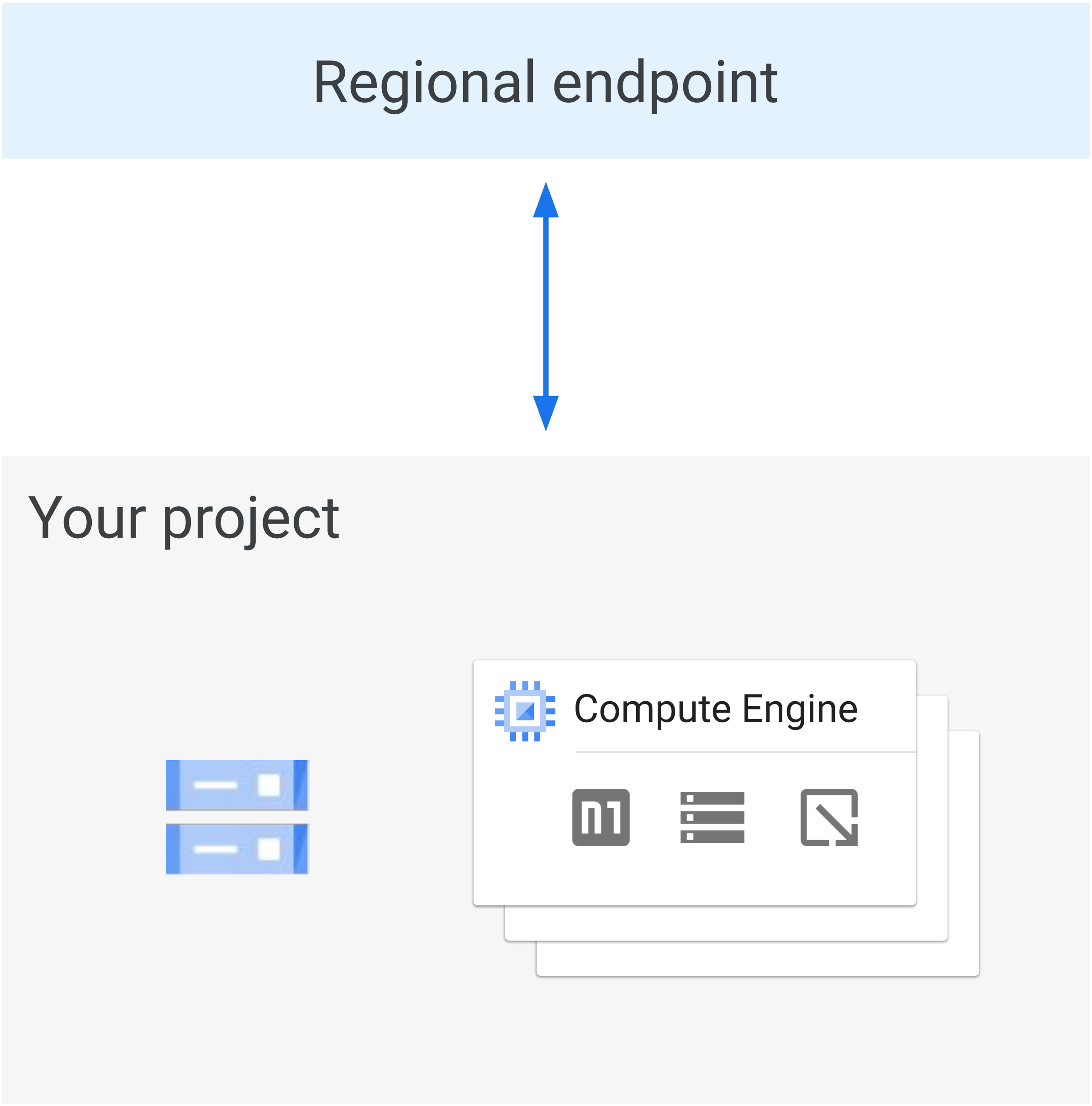
Shared VPC

Private IPs

CMEK

Data locality

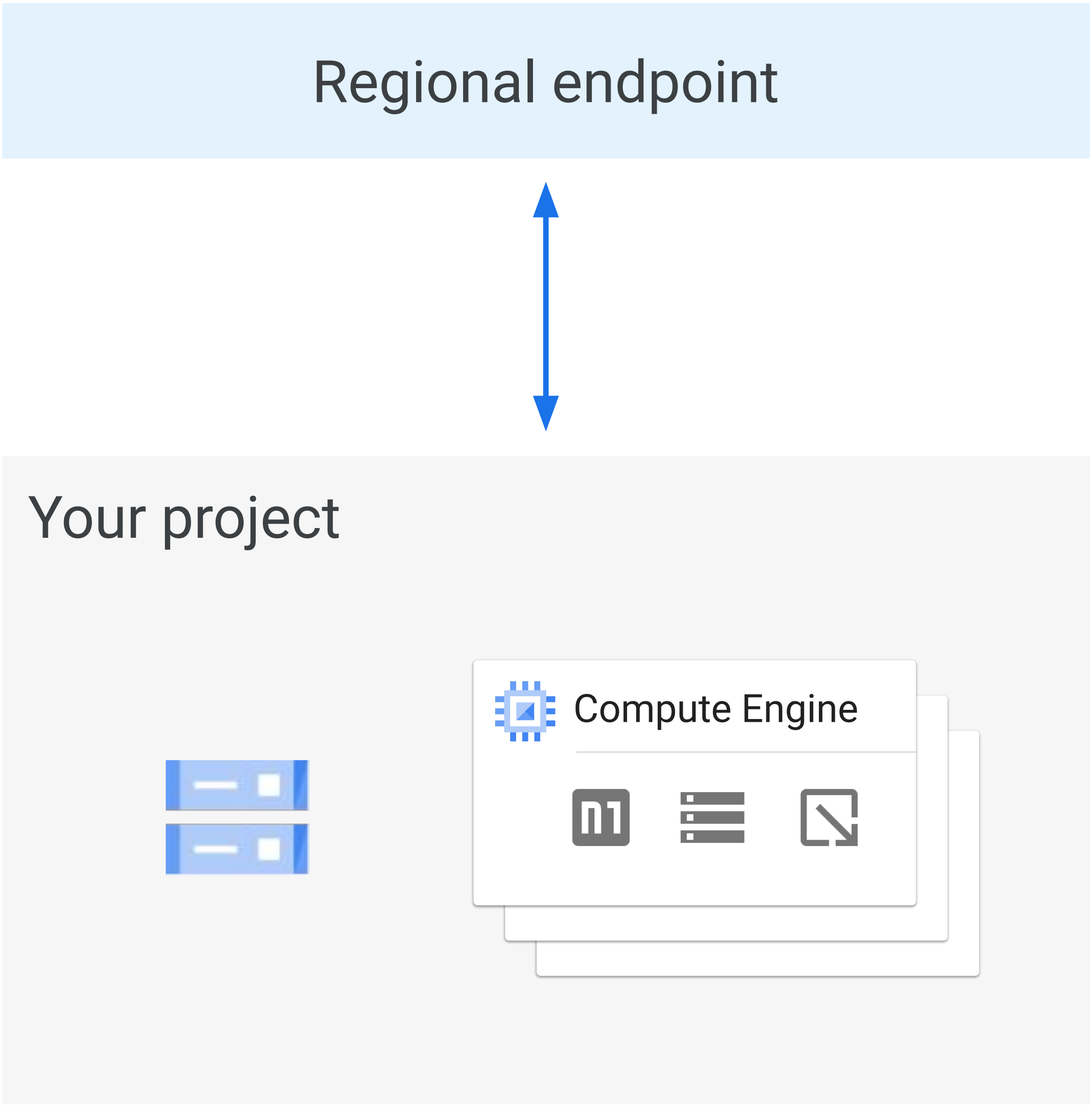
What is a regional endpoint?



Data locality

What is a regional endpoint?

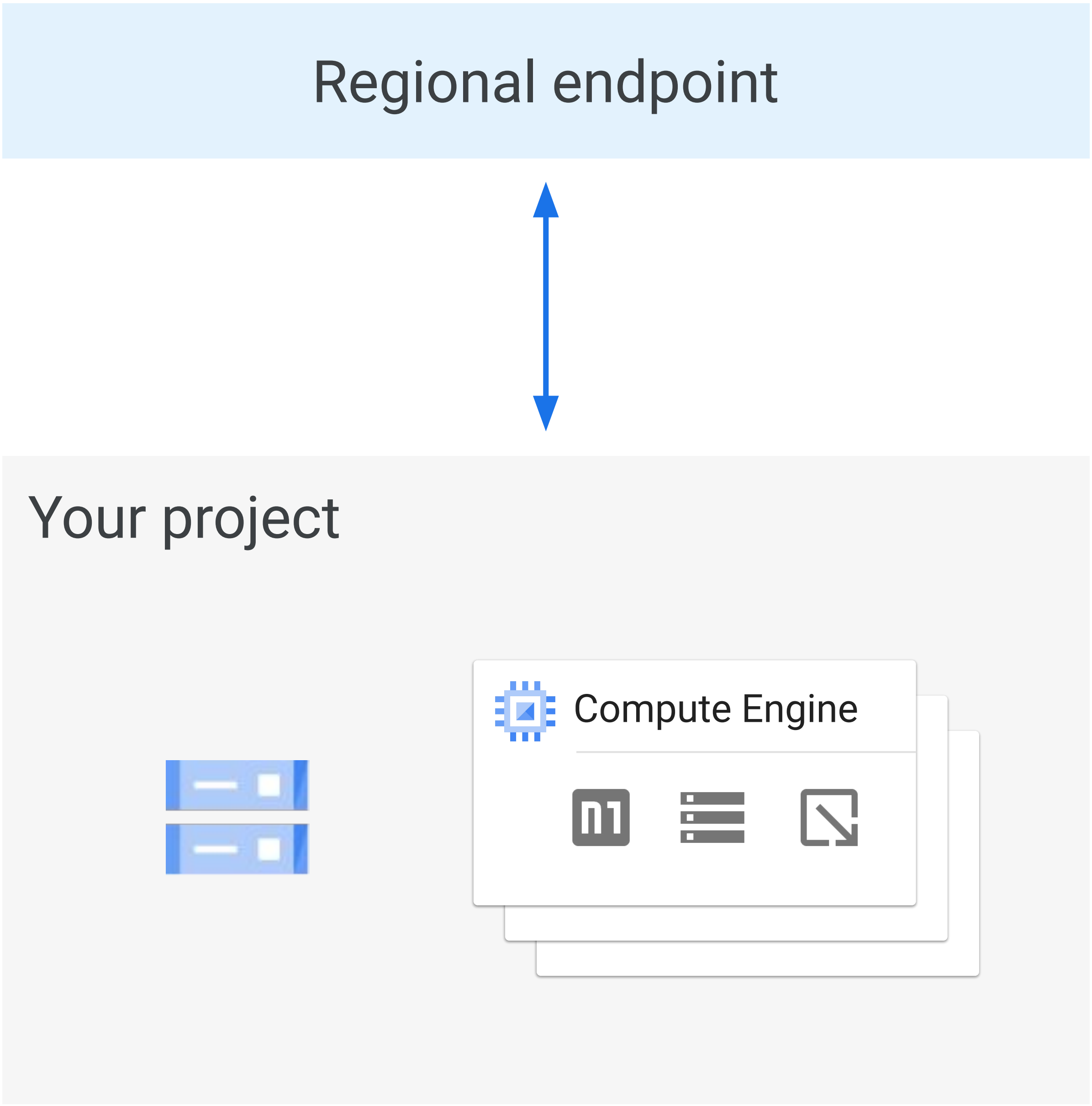
- Backend that deploys and controls your Dataflow workers



Data locality

What is a regional endpoint?

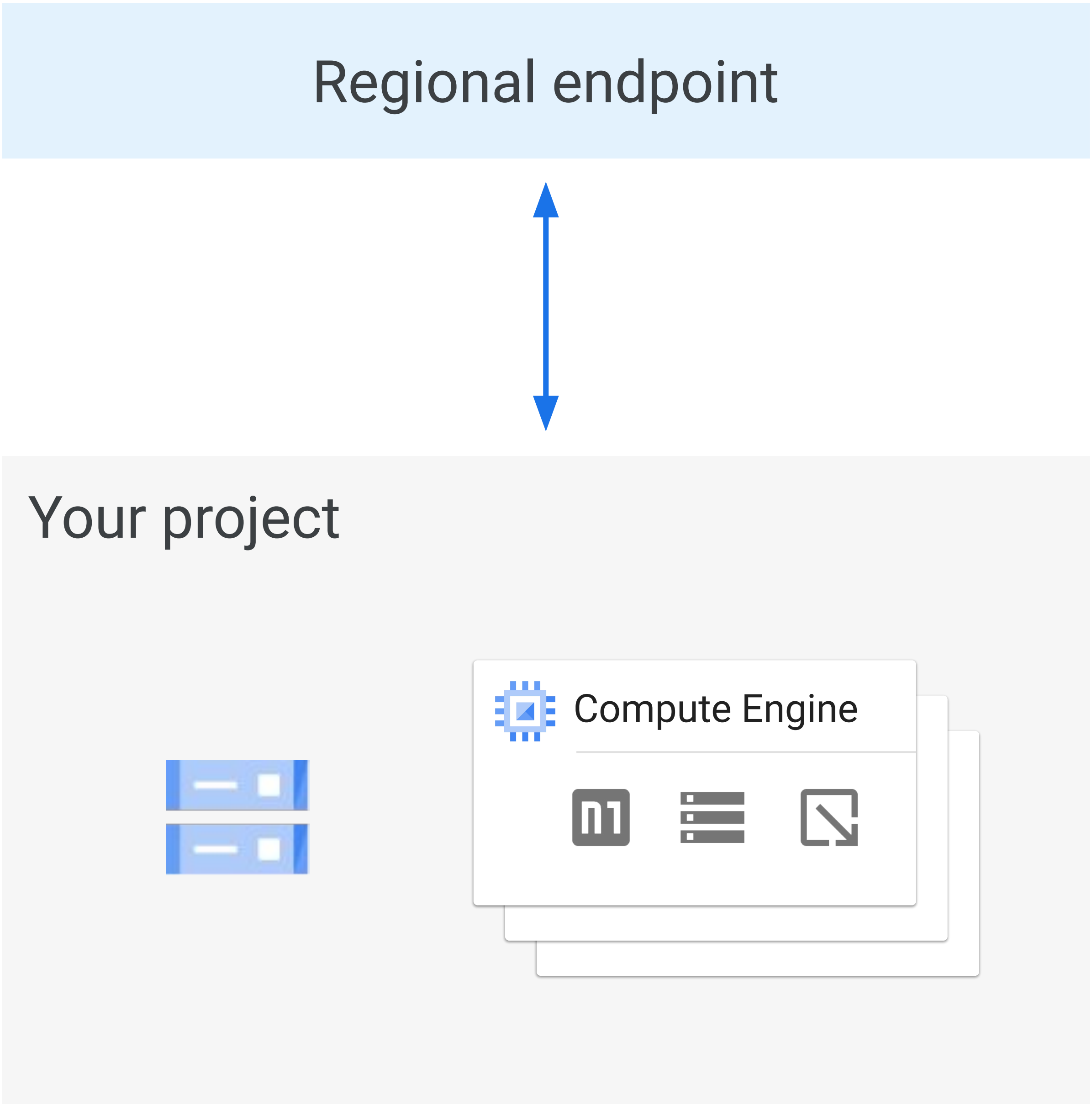
- Backend that deploys and controls your Dataflow workers
- Talks with the Dataflow service account in your project



Data locality

What is a regional endpoint?

- Backend that deploys and controls your Dataflow workers
- Dataflow service account in your project talks with the regional endpoint
- Stores and handles metadata about your Dataflow job



Data locality

Why specify a regional endpoint?

Data locality

Why specify a regional endpoint?

- Security and compliance

Data locality

Why specify a regional endpoint?

- Security and compliance
- Minimize network latency and network transport costs

Data locality: How to specify a regional endpoint

No zone preference

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT  --temp_location gs://$BUCKET/tmp/  \
  --region $REGION
```

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --tempLocation=gs://$BUCKET/tmp/  \
  --region=$REGION"
```

Data locality: How to specify a regional endpoint

Run worker in a specific zone in a region with a regional endpoint

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT  --temp_location gs://$BUCKET/tmp/  \
  --region $REGION  --worker_zone $WORKER_ZONE
```

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --tempLocation=gs://$BUCKET/tmp/  \
  --region=$REGION --workerZone=$WORKER_ZONE"
```

Data locality: How to specify a regional endpoint

Run worker in a region with no regional endpoint

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT  --temp_location gs://$BUCKET/tmp/  \
  --region $REGION  --worker_region $WORKER_REGION
```

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --tempLocation=gs://$BUCKET/tmp/  \
  --region=$REGION --workerRegion=$WORKER_REGION"
```

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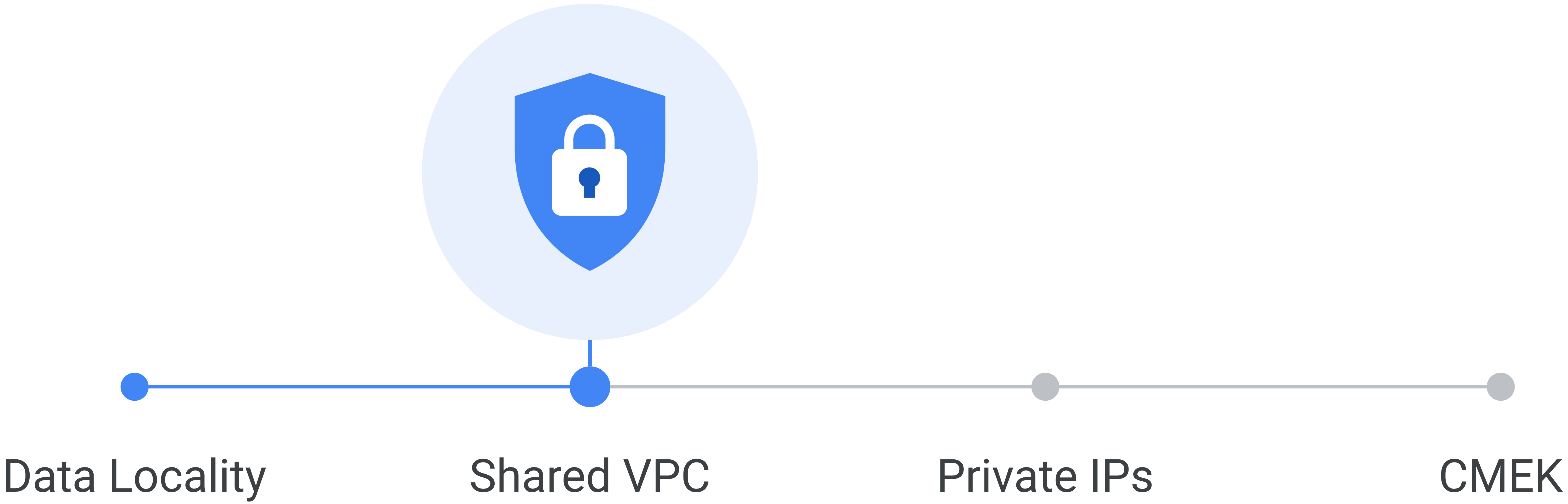


Data Locality

Shared VPC

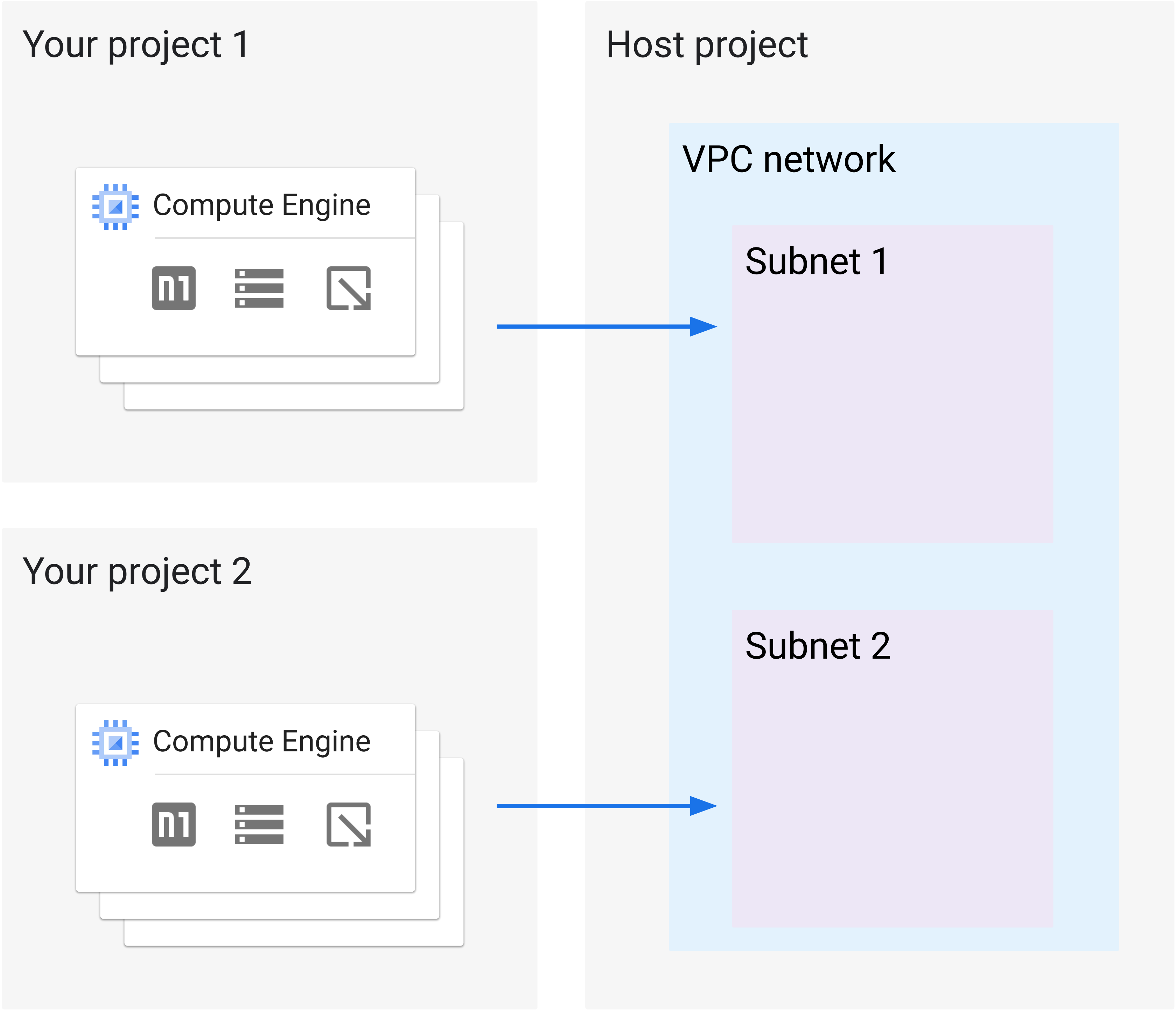
Private IPs

CMEK

Shared VPC

Hosts and services

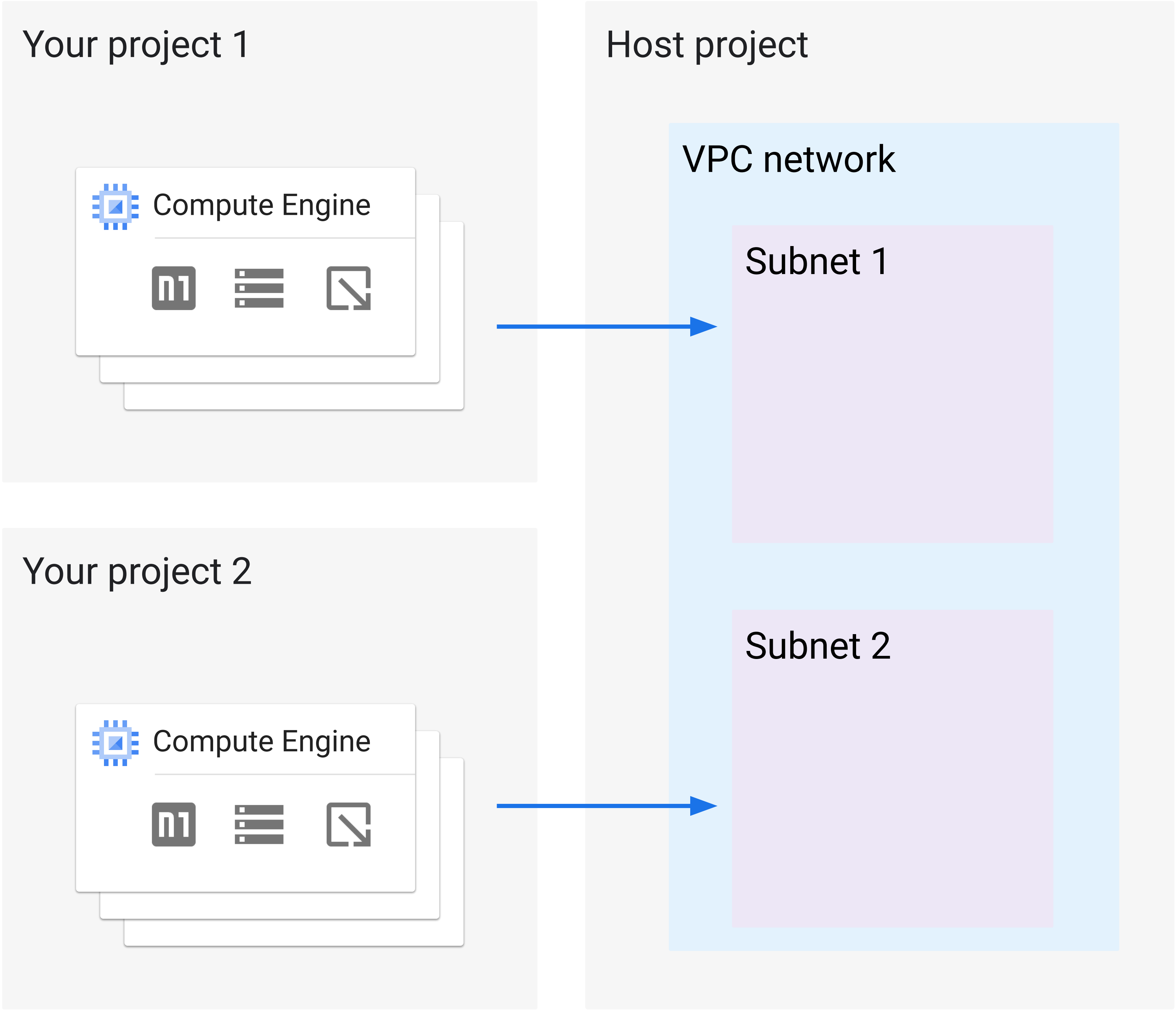
- Dataflow jobs can run in either VPC or Shared VPC



Shared VPC

Hosts and services

- Dataflow jobs can run in either VPC or Shared VPC
- Works for both default and custom networks



Shared VPC

Hosts and services

- Dataflow jobs can run in either VPC or Shared VPC
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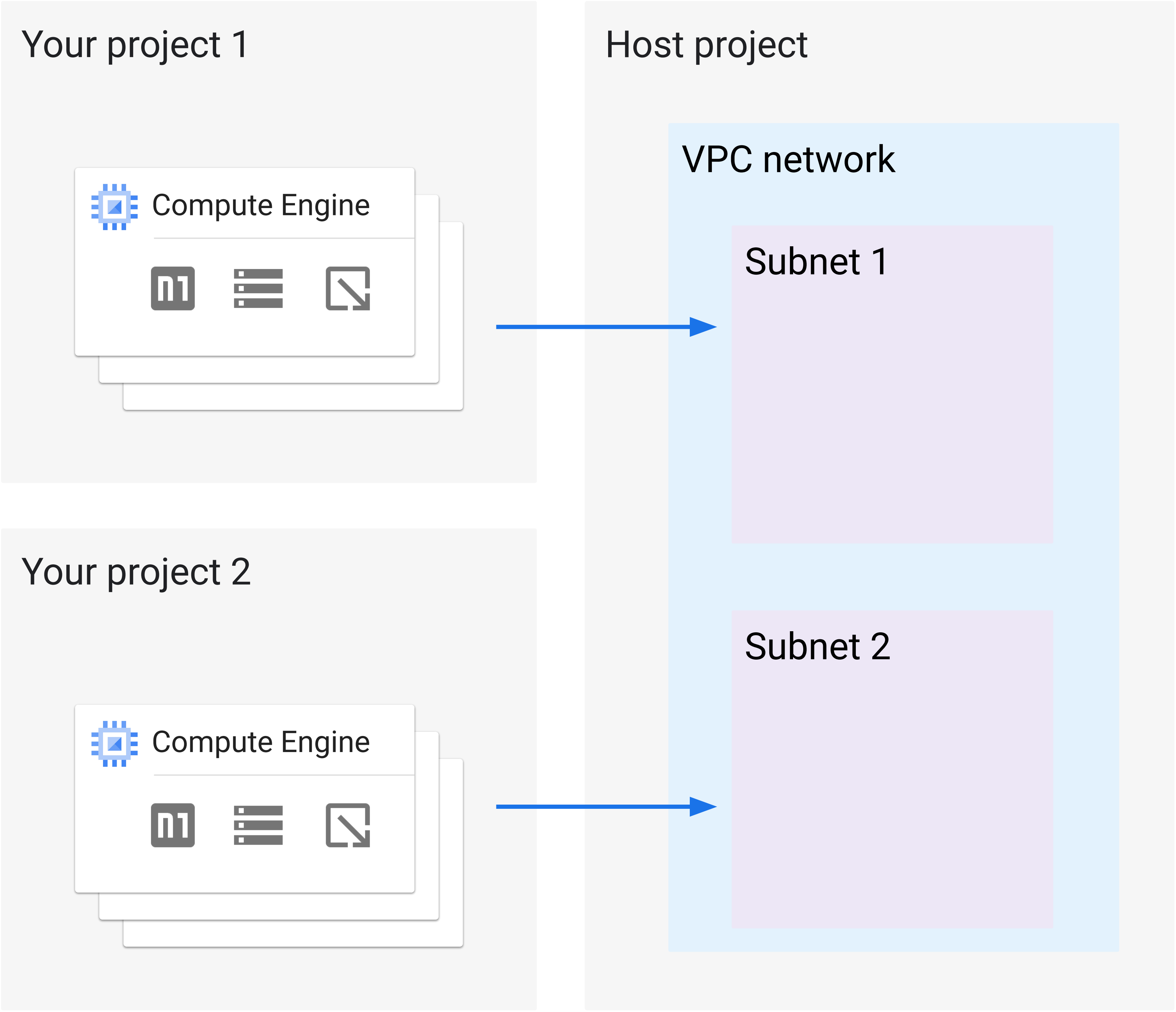
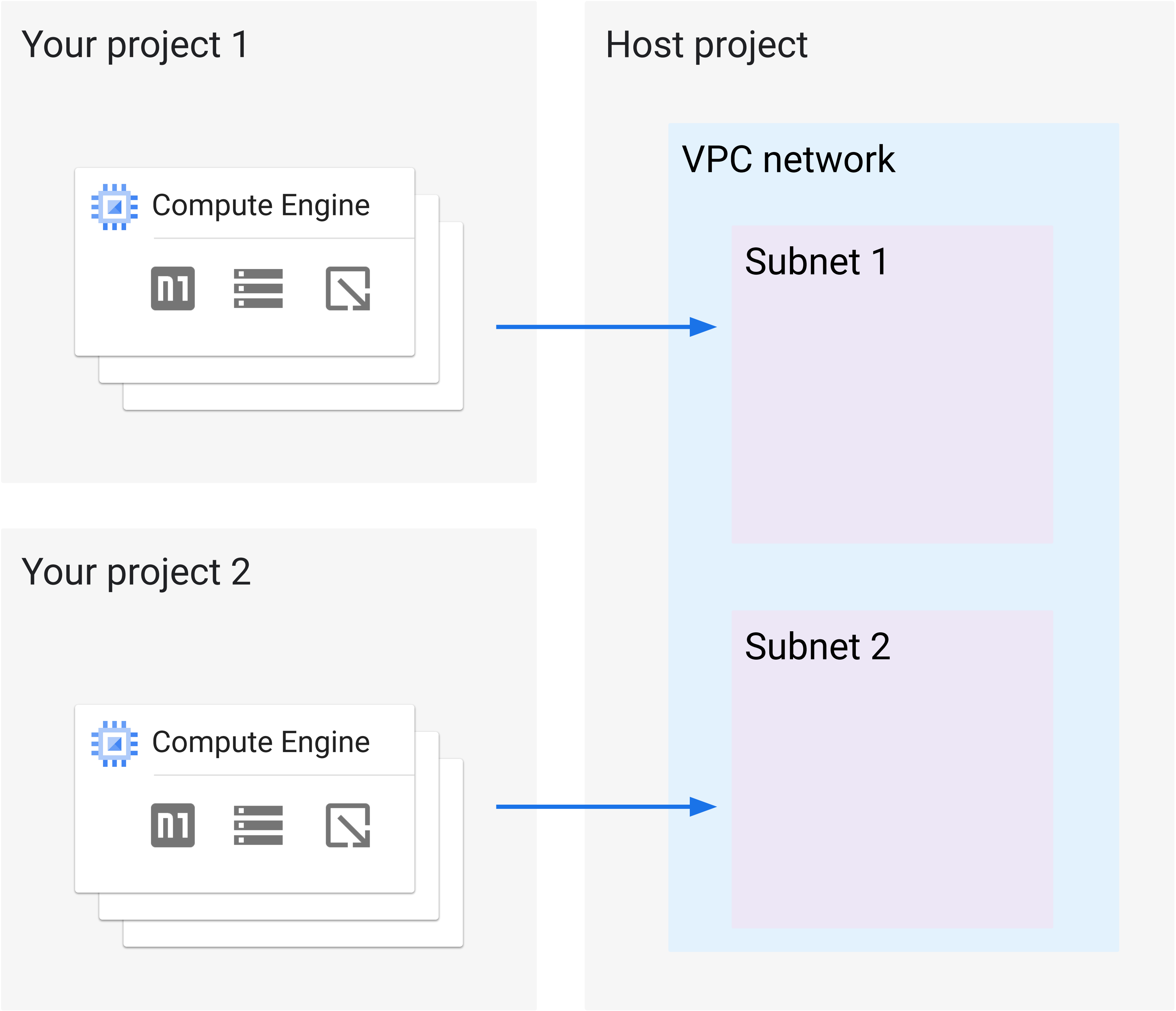
- Number of VMs is constrained by subnet IP block size



Shared VPC

Hosts and services

- Dataflow jobs can run in either VPC or Shared VPC
- Works for both default and custom networks
- Number of VMs is constrained by subnet IP block size
- Dataflow service account needs Compute Network User role in host project



Shared VPC: How to set

Use --network or --subnetwork flag

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT  --temp_location gs://$BUCKET/tmp/  --region $REGION \
  --network default
```

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --tempLocation=gs://$BUCKET/tmp/ --region=$REGION \
  --subnetwork=https://www.googleapis.com/compute/v1/projects/$HOST_PROJECT_ID/regions/$REG
  ION/subnetworks/$SUBNETWORK
```

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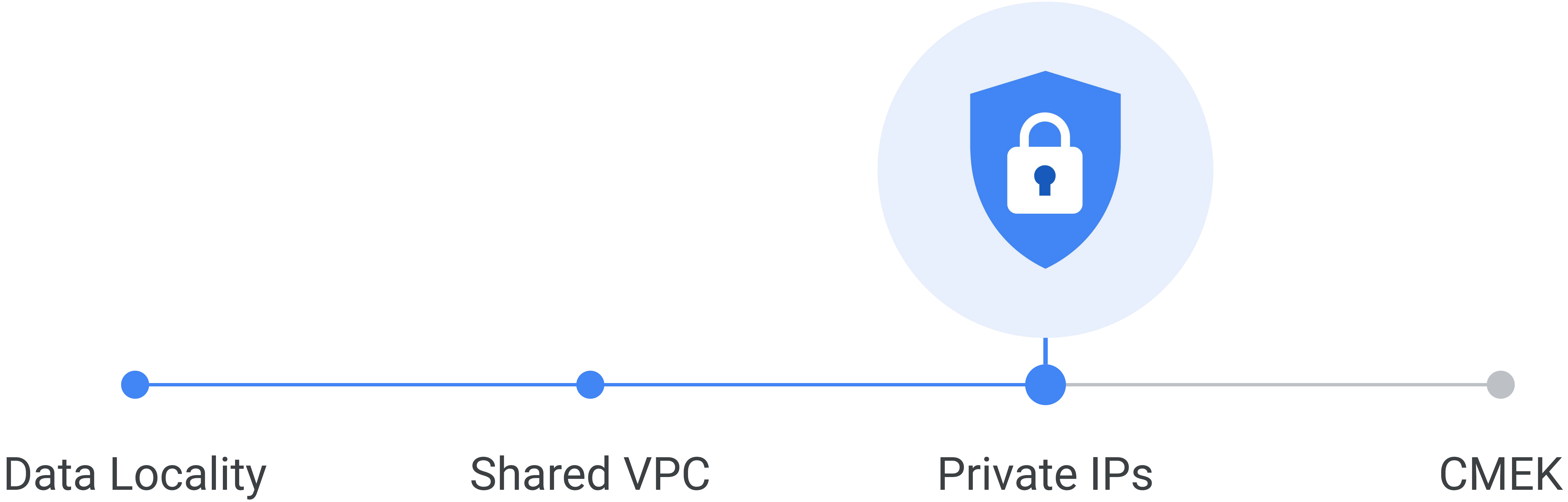

Data Locality

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CMEK

Private IPs

No external IPs

- Secure your data processing infrastructure

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- Pipeline cannot access the internet and other Google Cloud networks

Private IPs

No external IPs

- Secure your data processing infrastructure
- Pipeline cannot access the internet and other Google Cloud networks
- Network must have Private Google Access on in order to reach Google Cloud APIs and services

Private IPs: How to set

Python: Use **--network** or **--subnetwork** flag and **--no_use_public_ips** flag

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT  --temp_location gs://$BUCKET/tmp/  --region $REGION \
  --subnetwork regions/$REGION/subnetworks/$SUBNETWORK \
  --no_use_public_ips
```

Java: Use **--network** or **--subnetwork** flag and **--usePublicIps** flag

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --tempLocation=gs://$BUCKET/tmp/ --region=$REGION \
  --subnetwork=regions/$REGION/subnetworks/$SUBNETWORK \
  --usePublicIps=false”
```

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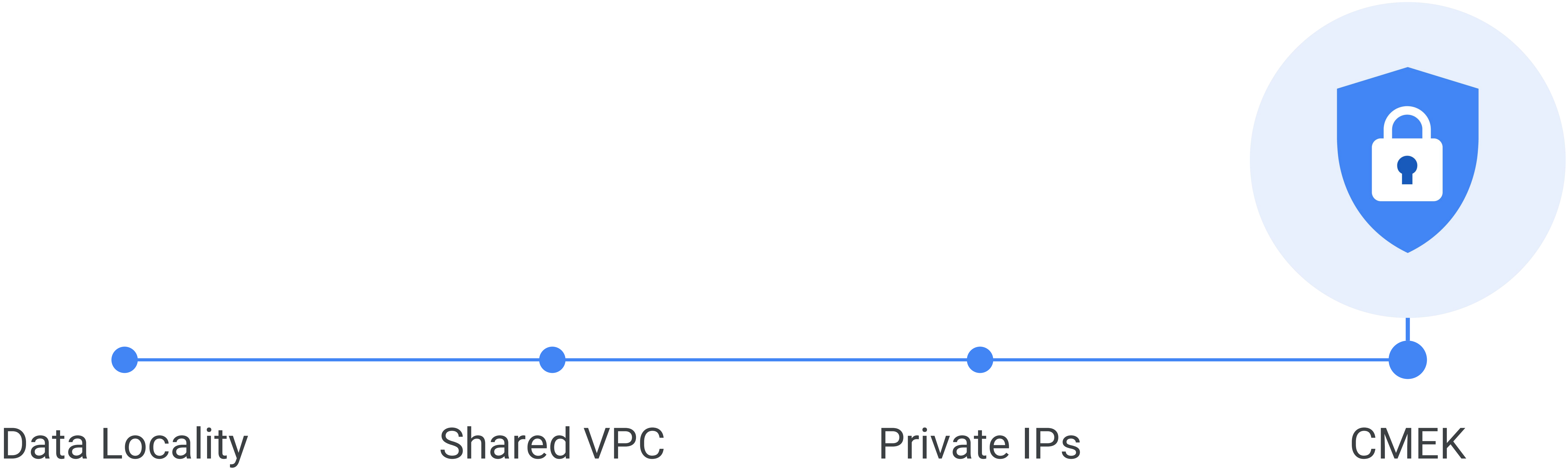

Data Locality

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CMEK

What is it?

- Where data is stored:
  - Persistent Disk
  - Storage buckets
  - Dataflow Shuffle backend
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- Where data is stored:
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- Metadata is protected by Google-managed key encryption.

CMEK

What is it?

- Where data is stored:
  - Persistent Disk
  - Storage buckets
  - Dataflow Shuffle backend
  - Streaming Engine backend
- Data keys in grouping operations are decrypted using CMEK key.
- Metadata is protected by Google-managed key encryption.
- Add Cloud KMS CryptoKey Encrypter/Decrypter role to Dataflow service account and Controller Agent service account.

CMEK: How to set

Python: Use **--temp_location** and **--dataflow_kms_key** flags

```
$ python3 -m apache_beam.examples.wordcount \
  --input gs://dataflow-samples/shakespeare/kinglear.txt \
  --output gs://$BUCKET/results/outputs --runner DataflowRunner  \
  --project $PROJECT --region $REGION --temp_location gs://$BUCKET/tmp/ \
  --dataflow_kms_key=projects/$PROJECT/locations/$REGION/keyRings/$KEY_RING/cryptoKeys/$KEY
```

Java: Use **--tempLocation** and **dataflowKmsKey** flags

```
$ gradle clean execute -DmainClass=org.apache.beam.examples.WordCount -Dexec.args="\
  --inputFile=gs://apache-beam-samples/shakespeare/kinglear.txt \
  --output=gs://$BUCKET/results/outputs --runner=DataflowRunner \
  --project=$PROJECT --region=$REGION --tempLocation=gs://$BUCKET/tmp/ \
  --dataflowKmsKey=projects/$PROJECT/locations/$REGION/keyRings/$KEY_RING/cryptoKeys/$KEY”
```