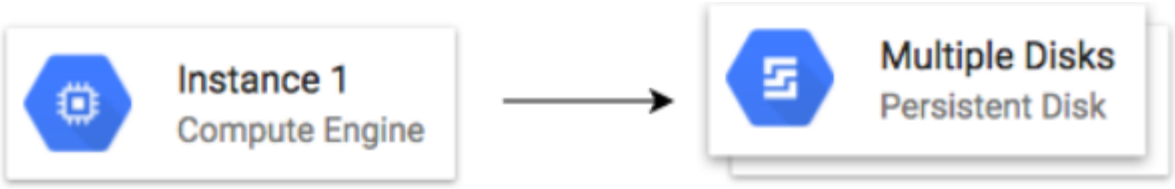
Encryption

Data States

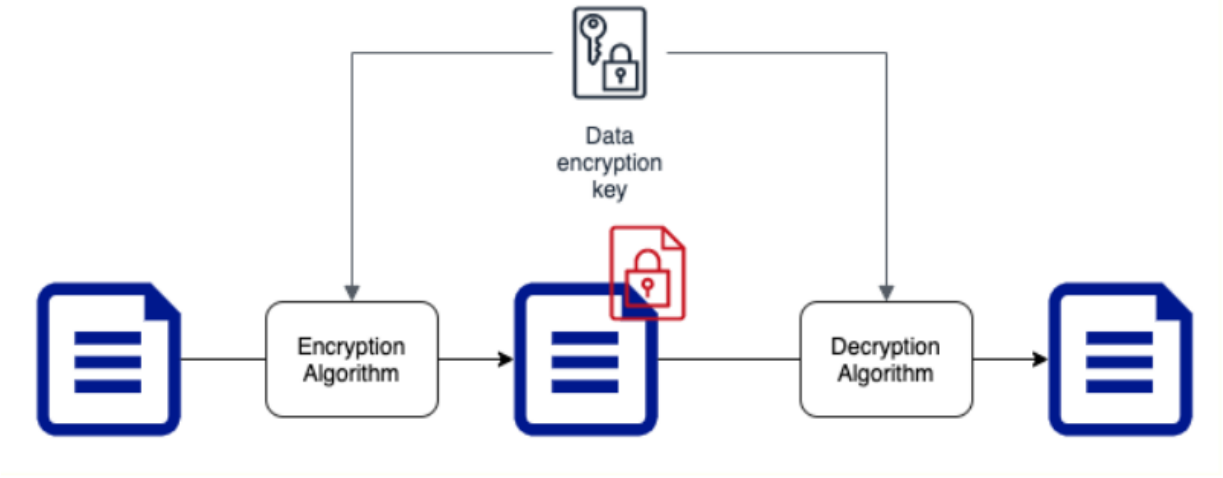


* **Data at rest:** Stored on a device or a backup.

- Examples : data on a hard disk, in a database, backups and archives.
- Data in motion: Being transferred across a network
- Also called Data in transit.
- Examples :
- Data copied from on-premise to cloud storage.
- An application talking to a database.
- Two Types: In and out of cloud (from internet)
- Within cloud
- Data in use: Active data processed in a non-persistent state Example: Data in your RAM

- If you store data as is, what would happen if an unauthorized entity gets access to it?
- Imagine losing an unencrypted hard disk
- **First law of security :** Defense in Depth
- Typically, enterprises encrypt all data
- Data on your hard disks
- Data in your databases
- Data on your file servers
- Is it sufficient if you encrypt data at rest?
- **No. Encrypt data in transit** - between application to database as well.

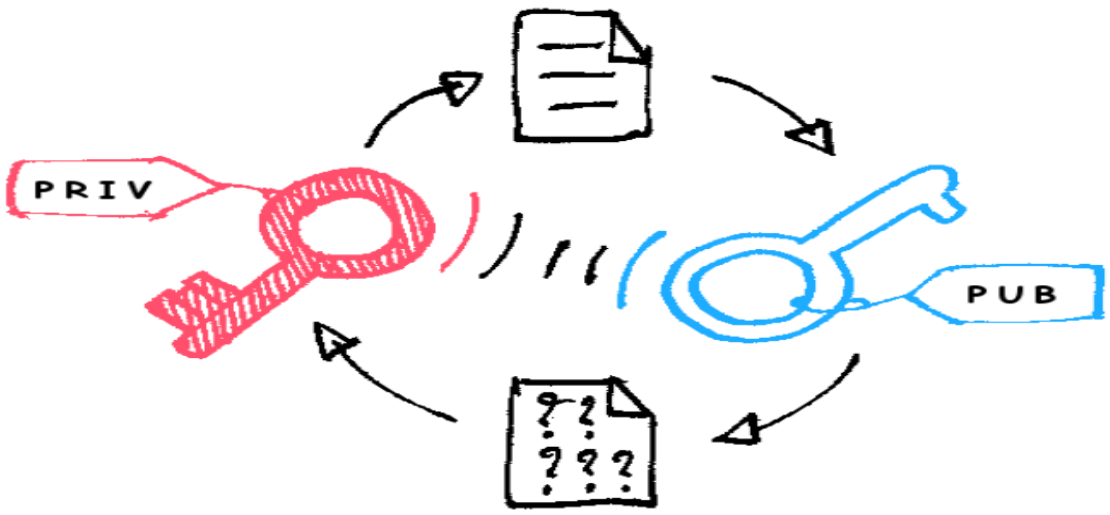
Symmetric Key Encryption



* Symmetric encryption algorithms use the same key for encryption and decryption.

- Key Factor 1: Choose the right encryption algorithm.
- Key Factor 2: How do we secure the encryption key?
- Key Factor 3: How do we share the encryption key?

Asymmetric Key Encryption



https://commons.wikimedia.org/wiki/File:Asymmetric_encry

* **Two Keys :** Public Key and Private.

- Key Also called **Public Key Cyptography**
- Encrypt data with Public Key and decrypt with Private Key.
- Share Public Key with everybody and keep the Private Key with you(YEAH, ITS PRIVATE!)
- No crazy questions:

- Will somebody not figure out private key using the public key?
- How do you create Asymmetric Keys?

Cloud KMS

* Create and manage cryptographic keys (symmetric and asymmetric).
* Control their use in your applications and GCP Services.
* Provides an API to encrypt, decrypt, or sign data.
* Use existing cryptographic keys created on premises.
* Integrates with almost all GCP services that need data encryption:
* Google-managed key: No configuration required
* Customer-managed key: Use key from KMS
* Customer-supplied key: Provide your own key