Data Engineer roadmap

- Personal recommendation
- General recommendation
- Cloud based

CS fundamentals

- Basic Terminal usage
- Data structures & algorithms
- [illegible]
- Structured vs unstructured data
- Serialisation
- Linux
- [illegible]

- CLI
- Vim
- Shell scripting
- Cronjobs

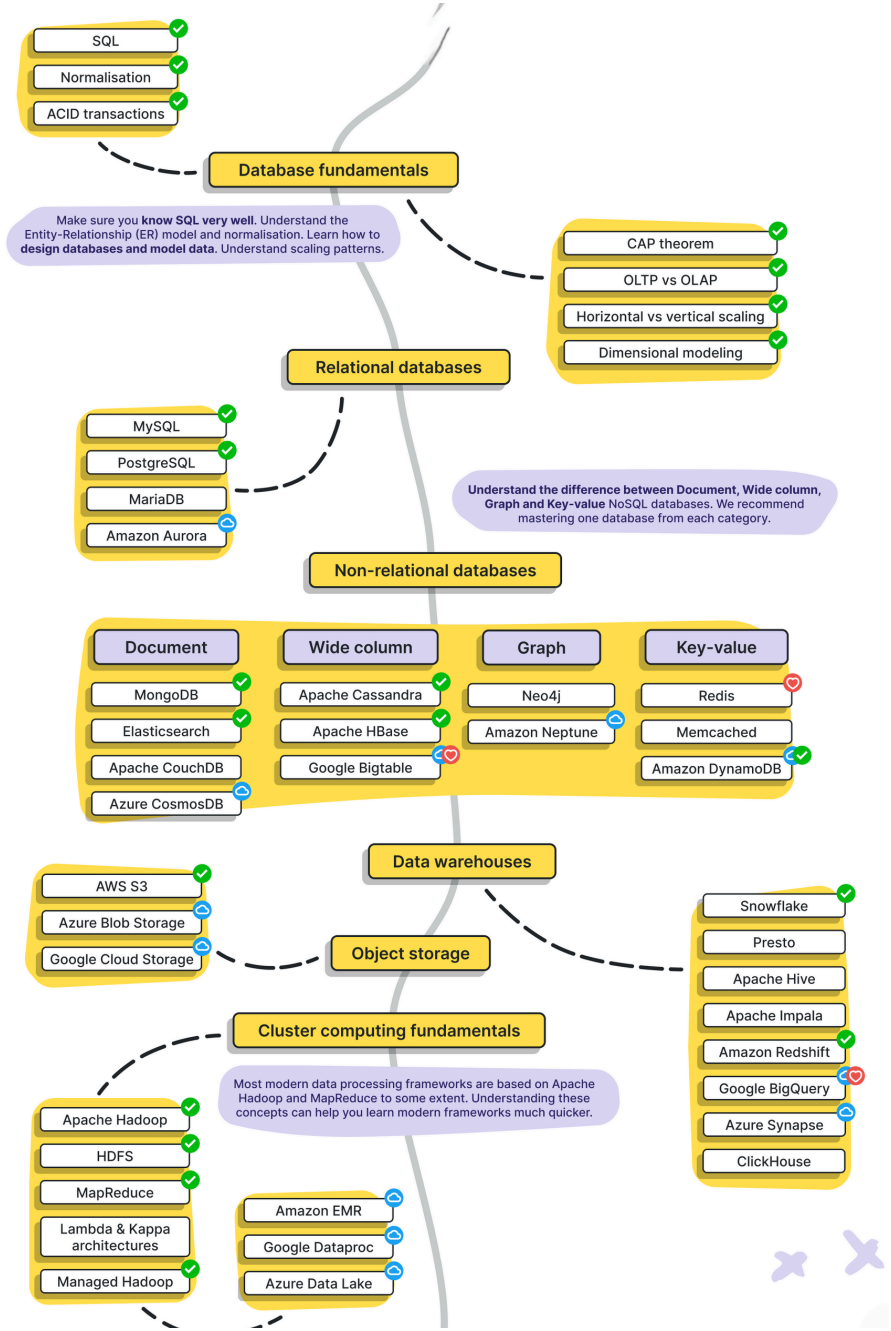
- How does the computer work?
- How does the Internet work?
- Git — Version control

Git is used for tracking changes in source code and coordinating work among programmers. In your day to day work you will use Git server as a service like **GitHub, GitLab or Bitbucket**.

Learn a programming language

- Python
- Java
- Scala
- Go

Learn how to write clean, extensibile code. Spend some time understanding **programming paradigms and best practices**. Get familiar with an IDE or code editor like **VSCode**.


SQL
Normalisation
ACID transactions
Database fundamentals
Make sure you know SQL very well. Understand the Entity-Relationship (ER) model and normalisation. Learn how to design databases and model data. Understand scaling patterns.
CAP theorem
OLTP vs OLAP
Horizontal vs vertical scaling
Dimensional modeling
Relational databases
MySQL
PostgreSQL
MariaDB
Amazon Aurora
Understand the difference between Document, Wide column, Graph and Key-value NoSQL databases. We recommend mastering one database from each category.
Non-relational databases
Document
MongoDB
Elasticsearch
Apache CouchDB
Azure CosmosDB
Wide column
Apache Cassandra
Apache HBase
Google Bigtable
Graph
Neo4j
Amazon Neptune
Key-value
Redis
Memcached
Amazon DynamoDB
Data warehouses
Snowflake
Presto
Apache Hive
Apache Impala
Amazon Redshift
Google BigQuery
Azure Synapse
ClickHouse
Object storage
AWS S3
Azure Blob Storage
Google Cloud Storage
Cluster computing fundamentals
Most modern data processing frameworks are based on Apache Hadoop and MapReduce to some extent. Understanding these concepts can help you learn modern frameworks much quicker.
Apache Hadoop
HDFS
MapReduce
Lambda & Kappa architectures
Managed Hadoop
Amazon EMR
Google Dataproc
Azure Data Lake

Data processing

Hybrid frameworks are able to process both batch and streaming data. Batch data processing is often done by analytical data warehouse applications. See **Data warehouses** for more.

Batch

- Apache Pig
- Apache Arrow
- data build tool

Hybrid

- Apache Spark
- Apache Beam
- Apache Flink
- Apache NiFi

Streaming

- Apache Kafka
- Apache Storm
- Apache Samza
- Amazon Kinesis

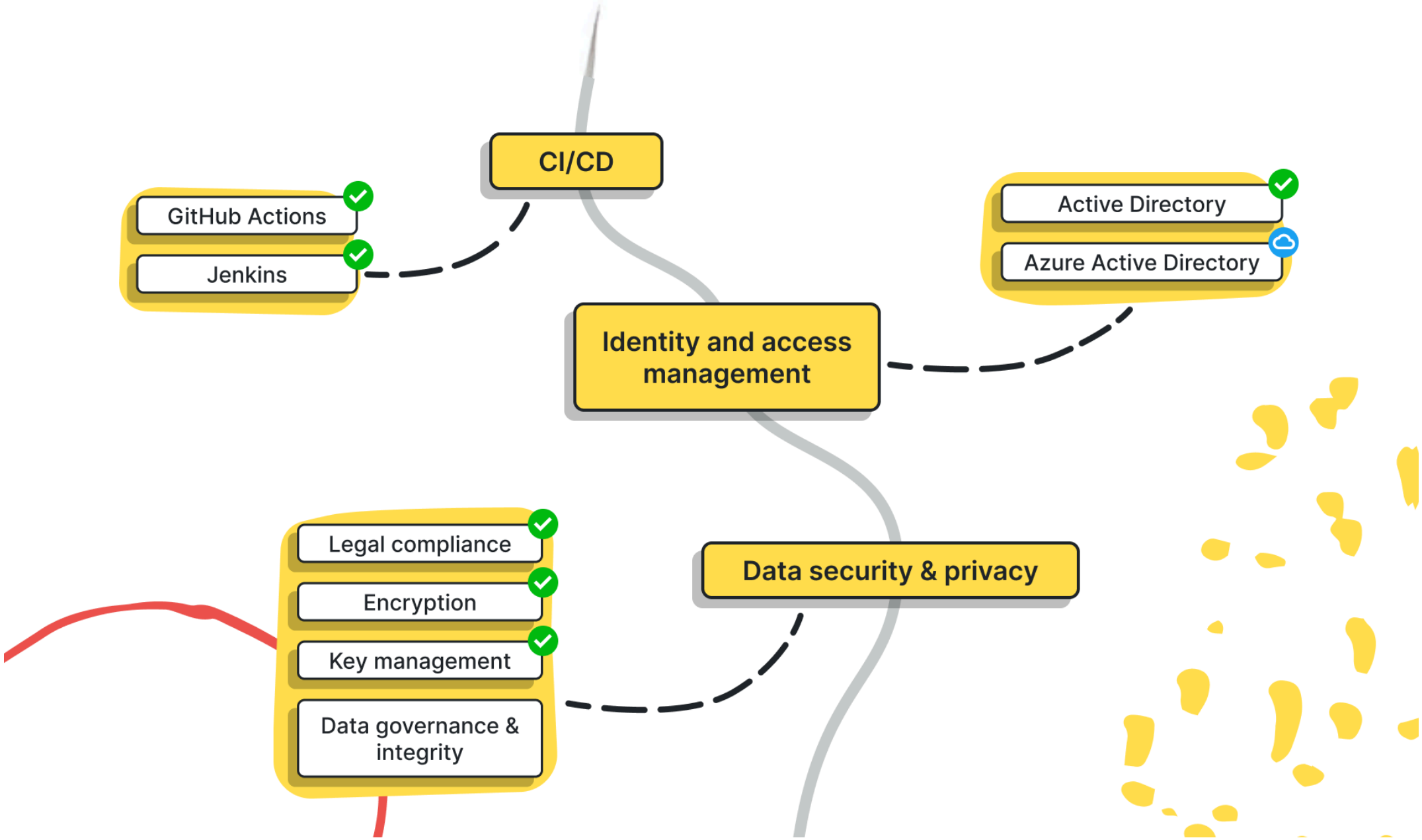
Workflow scheduling

- Apache Airflow
- Google Composer
- Apache Oozie
- Luigi

Cloud Composer is a managed Apache Airflow service on Google Cloud Platform.

Monitoring data pipelines

- Prometheus
- Datadog
- Sentry
- StatsD


CI/CD
GitHub Actions
Jenkins
Identity and access management
Active Directory
Azure Active Directory
Data security & privacy
Legal compliance
Encryption
Key management
Data governance & integrity