Universitat de Lleida
Departament d'Informàtica
i Enginyeria Industrial

# Programming and Communications III: Subject Context

Jordi Ricard Onrubia Palacios

Departament d'Informàtica i Enginyeria Industrial Universitat de Lleida

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i Enginyeria Industrial

# Programming and Communications III: IoT

- ➢ IoT
- ❑ Data
- ❑ Web Development
- ❑ Front End
- ❑ Back End

# IoT

The Internet of Things (IoT) refers to a network of physical devices (or "things") embedded with sensors, software, and other technologies that enable them to connect, collect, and exchange data over the internet. These devices can be anything from household appliances to industrial machinery, vehicles, or wearable devices.

# IoT - Components

- Devices ("Things"): Physical objects equipped with sensors, actuators, and communication hardware.
- Connectivity: Devices communicate via various technologies such as Wi-Fi, Bluetooth, or cellular networks.
- Collection: Data obtained from IoT devices must be stored somewhere, common technologies are Cloud Computing, IoT Gateways, API Servers
- Computation: Data collected from IoT devices is analyzed to generate useful insights or trigger actions.
- Consumption: Data Stored can be consumed by means of UI or just by providing the data using APIs
- User Interface: Users interact with IoT systems via apps, dashboards, or voice commands to control devices and view data.

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# Programming and Communications III: Data LifeCycle

- ❏ IoT
- ➢ Data LifeCycle
- ❏ Web Development
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- ❏ Back End

# Data LifeCycle

The data lifecycle refers to the stages that data goes through from creation or acquisition to eventual deletion or archiving. Managing this lifecycle effectively ensures data is used efficiently, remains secure, and complies with regulations.

# Data LifeCycle

1. Data Creation/Collection: The process of generating or capturing data from various sources.
2. Data Storage: Safely storing data for access and processing.
3. Data Processing: Transforming raw data into a usable format.
4. Data Usage/Analysis: Utilizing processed data to extract insights or take action.
5. Data Sharing: Making data available to authorized parties or systems.
6. Data Archiving: Moving data that is no longer actively used to long-term storage.
7. Data Deletion: Permanently removing data when it is no longer needed

We will center the subject in the underlined stages

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# Programming and Communications III: Web Development

- ❑ IoT
- ❑ Data LifeCycle
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- ❑ Back End

# Web Development

Web development involves creating, building, and maintaining websites and web applications. It includes several disciplines, tools, and technologies .

# Web Development - Main Points

- Frontend Development (Client-Side):
  - Focus: User interface and experience.
  - Goal: Create responsive, interactive, and visually appealing designs.
- Backend Development (Server-Side):
  - Focus: Server-side logic, database interactions, APIs.
  - Goal: Ensure secure, efficient, and scalable server operations.
- Full-Stack Development:
  - Focus: Combines frontend and backend development.
  - Goal: Develop a complete, end-to-end web application.
- Database Management:
  - Focus: Organizing, storing, and retrieving data.
  - Goal: Secure, scalable, and efficient data storage.
- DevOps & Deployment:
  - Focus: Managing infrastructure, deploying applications, and ensuring scalability.
  - Goal: Seamless deployment and maintenance of web applications.
- Web Security:
  - Focus: Protecting websites from vulnerabilities and attacks.
  - Goal: Maintain data integrity, confidentiality, and availability.
- Performance Optimization:
  - Focus: Improving website speed and responsiveness.
  - Goal: Provide fast and seamless user experiences.
- UX/UI Design:
  - Focus: Designing intuitive and user-friendly interfaces.
  - Goal: Enhance user satisfaction and usability.

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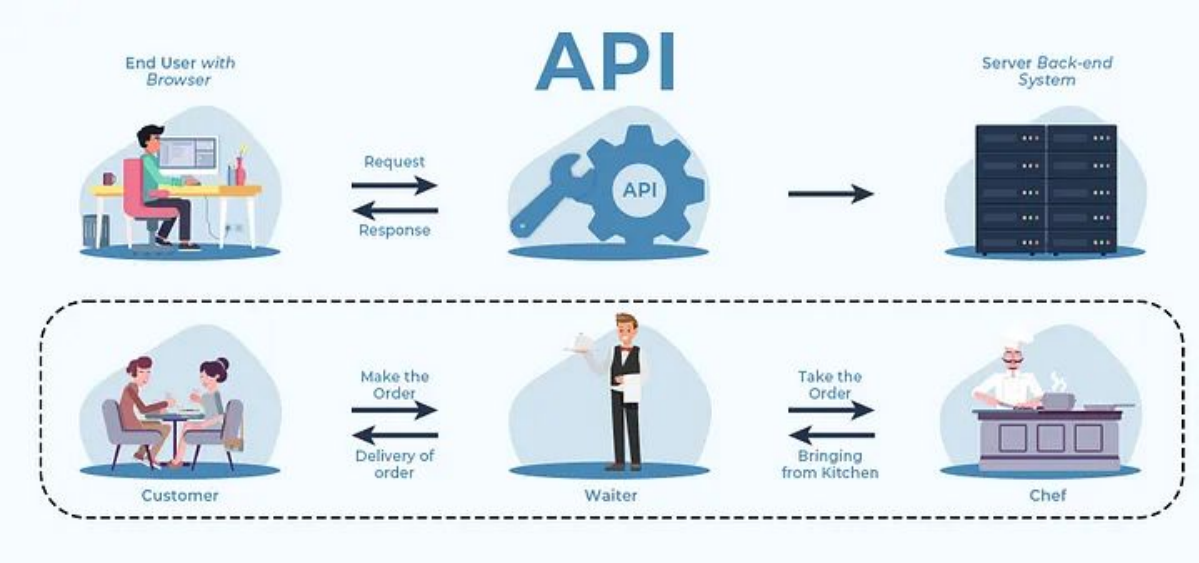
# Programming and Communications III: Back End

- ❏ IoT
- ❏ Data LifeCycle
- ❏ Web Development
- ➢ Back End
- ❏ Database Management

# Back End

Backend development refers to the server-side of web development. It focuses on the functionality, logic, and processes that power a website or web application operates behind the scenes to handle data, business logic, and server communication.



# Back End - Main Points

- Server: A system that hosts your application and processes client requests.
- Application: The software that runs on the server, which includes all the logic for processing requests, managing user authentication, and executing business rules.
- API (Application Programming Interface): A set of rules and protocols that allow different parts of the application (or external systems) to communicate with each other.
- Database: Stores data for the application. Backend interacts with databases to retrieve, store, and update data.

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# Programming and Communications III: Database Management

- ❑ IoT
- ❑ Data LifeCycle
- ❑ Web Development
- ❑ Back End
- ➢ Database Management

# Back End

Database management is the process of efficiently storing, organizing, and accessing data using software tools known as Database Management Systems (DBMS). It ensures that data is structured, secure, and available for applications and users.

# Back End - Main Points

- Data Storage: Where data is physically stored on servers or in the cloud. Organizes data into tables (SQL) or collections (NoSQL).
- Data Retrieval: Allows applications and users to fetch data as needed using queries.
- Data Modification: Includes creating, updating, and deleting data entries.
- Data Security: Protects data from unauthorized access using encryption, access controls, and authentication.
- Backup and Recovery: Ensures data can be restored in case of loss, corruption, or failure.