

Good question 🙋 — here's a simple, clear explanation:

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### 💡 What is H2 Database?

**H2** is a **lightweight, in-memory database** that comes built into Java — perfect for **development and testing** small projects.

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### ⚙️ Main Idea

- It **runs inside your Spring Boot app** — no need to install or start a separate database server.
  - You can **store data temporarily in memory** (disappears when you stop the app), or **persist it to a local file** if you want.
  - It's **fully compatible with SQL**, so later you can easily switch to MySQL or PostgreSQL without changing much code.
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### 🌱 Why we use it

Environment	Recommended Database	Why
Development / Testing	H2	Super fast, simple setup, no external DB required
Production	MySQL / PostgreSQL	Persistent, secure, handles large data

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### 💻 How it looks in Spring Boot

When you add H2 Database as a dependency:

- Spring Boot automatically creates a temporary DB.
  - You can open the **H2 Console** at → <http://localhost:8080/h2-console>
  - Default JDBC URL:
  - `jdbc:h2:mem:testdb`
  - Username: `sa`  
Password: *(empty)*
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### 🧠 Example

If you create an entity:

@Entity

```
public class Bin {
```

```
    @Id
```

```
    @GeneratedValue
```

```
private Long id;

private String binCode;

private String location;

}
```

Spring Boot + H2 will automatically:

- Create a BIN table in memory.
- Let you insert and read records instantly — no setup needed.

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### Then, when ready for real deployment

You just change the config in application.properties or application.yml:

```
spring.datasource.url: jdbc:mysql://localhost:3306/smartwaste
```

```
spring.datasource.username: root
```

```
spring.datasource.password: yourpassword
```

```
spring.jpa.hibernate.ddl-auto: update
```

...and switch dependency to **MySQL Driver**.

Everything else (code, repositories, services) stays the same.

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### In short:

**H2 is a built-in temporary database used to quickly develop, test, and debug your Spring Boot app — before moving to a real database like MySQL in production.**

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Would you like me to show you **how to configure H2** and **access its web console** once you generate your project?