MVC

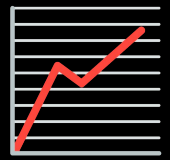
MVC

organization of a web application:

1. Model
2. View
3. Controller

MVC

organization of a web application:

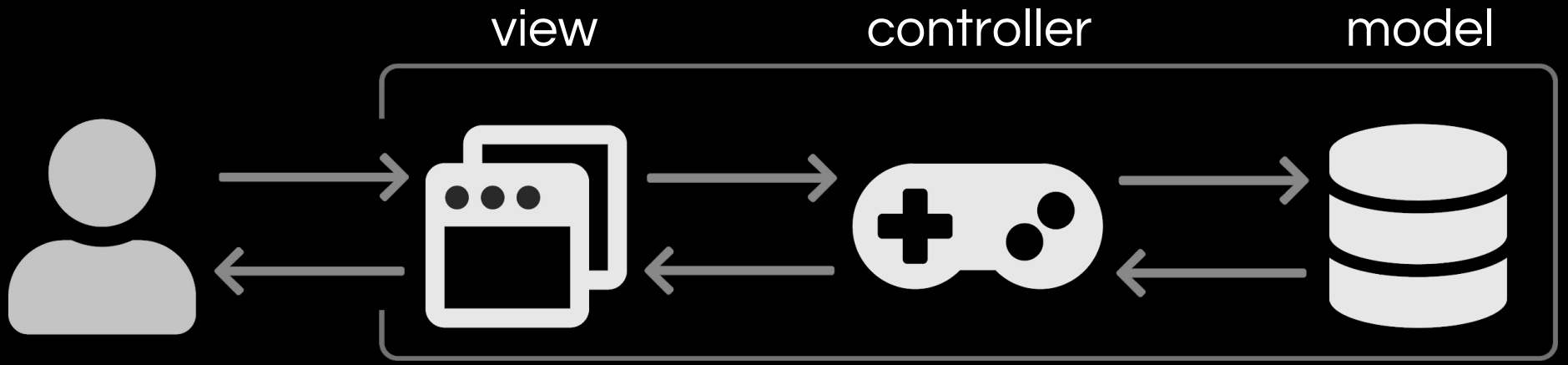
1. Model → Data 
2. View → Interface 🤗
3. Controller → Logic 🧠

MVC

organization of a web application:

1. Model → SQL 
2. View → HTML/CSS 🤗
3. Controller → Python 🧠

MVC



SQL

- INTEGER: smallint, integer, bigint
- NUMERIC: boolean, date, datetime, numeric(scale, precision), time, timestamp
- REAL: real, double precision
- TEXT: char(n), varchar(n), text

database review

SQL

database

students

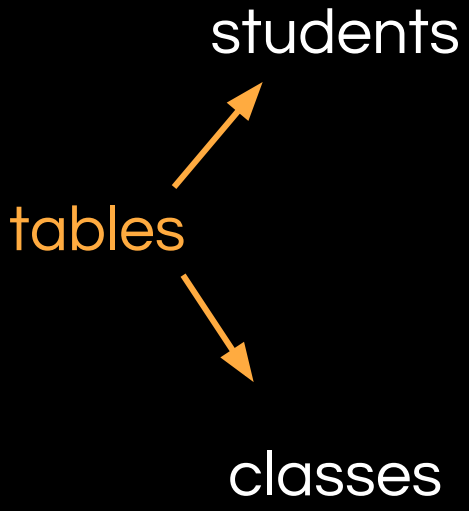
id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database



id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

database

SQL

columns

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database

primary keys

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

what is wrong here?

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

name is not a good identifier!

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	3	Adams
11250023	Jay Doe	4	Currier

instead...

classes

id	name	class
1048	James Doe	CS50
1049	James Doe	HUM10
1050	Jay Doe	STAT110

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

foreign key

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110

SQL

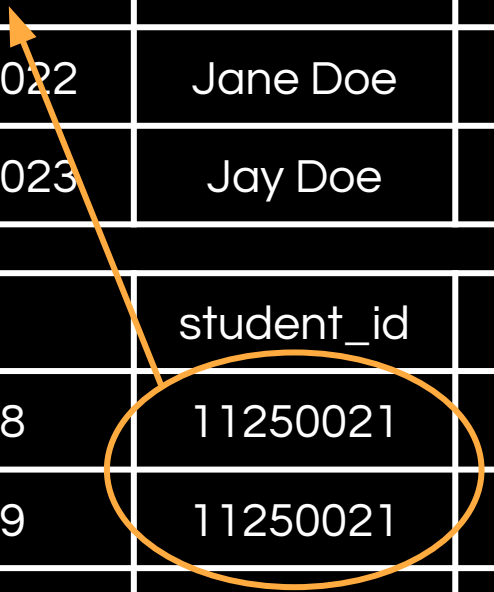
database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110



SQL

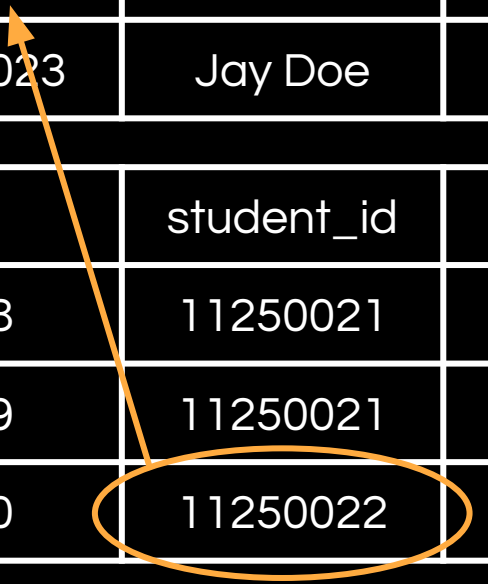
database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110



SQL syntax

SQL

INSERT
SELECT
UPDATE
DELETE

database

SQL

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110

SQL

the INSERT query adds information to table

```
INSERT INTO
<table>
(<columns>)
VALUES
(<values>)
```

SQL

the INSERT query adds information to table

```
INSERT INTO
classes
(student_id, class)
VALUES
('11250022', 'CS61')
```

database

SQL

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the INSERT query adds information to table

```
INSERT INTO
students
(name, year)
VALUES
('John Doe', 1)
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	1	None

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the SELECT query extracts information from table

SELECT
<columns>
FROM
<table>
WHERE
<predicate>

SQL

the SELECT query extracts information from table

```
SELECT
name, year
FROM
students
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	1	None

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the SELECT query extracts information from table

```
SELECT
name, year
FROM
students
WHERE
house = ‘Thayer’
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	1	None

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the SELECT query extracts information from table

```
SELECT
*
FROM
students
WHERE
year < 2
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	1	None

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the UPDATE query modifies information in a table

UPDATE
<table>
SET
<column> = <value>
WHERE
<predicate>

SQL

the UPDATE query modifies information in a table

```
UPDATE
students
SET
year = 2, house = ‘Winthrop’
WHERE
name = ‘John Doe’
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	2	Winthrop

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

the DELETE query removes information from table

DELETE FROM
<table>
WHERE
<predicate>

SQL

the DELETE query removes information from table

```
DELETE FROM
classes
WHERE
student_id = 11250022
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	2	Winthrop

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10

SQL with Flask

SQL

we will use a SQLite database and access it as:

```
db = SQL("sqlite:///database.db")
db.execute(query)
```

database

SQL

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	2	Winthrop

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

```
db = SQL("sqlite:///database.db")
...
item = db.execute("SELECT * FROM students
WHERE name = 'John Doe'")
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	2	Winthrop

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110
1051	11250022	CS61

SQL

```
db = SQL("sqlite:///database.db")
...
deleted_course = "CS61"
item = db.execute("DELETE FROM classes WHERE class = :course", course=deleted_course)
```

SQL

database

students

id	name	year	house
11250021	James Doe	1	Thayer
11250022	Jane Doe	2	Adams
11250023	Jay Doe	4	Currier
11250024	John Doe	2	Winthrop

classes

id	student_id	class
1048	11250021	CS50
1049	11250021	HUM10
1050	11250022	STAT110

final project to-dos

- ➔ Preproposals due by 11:59pm on Tue 11/6
- ➔ If collaborating with 1 or 2 classmates, each of you should submit a preproposal, even if identical.
- ➔ Proposals due by 11:59pm on Tue 11/13