```python
from flask import Flask, render_template

app = Flask(__name__)

@app.route("/")
def index():
    return render_template("index.html")
```
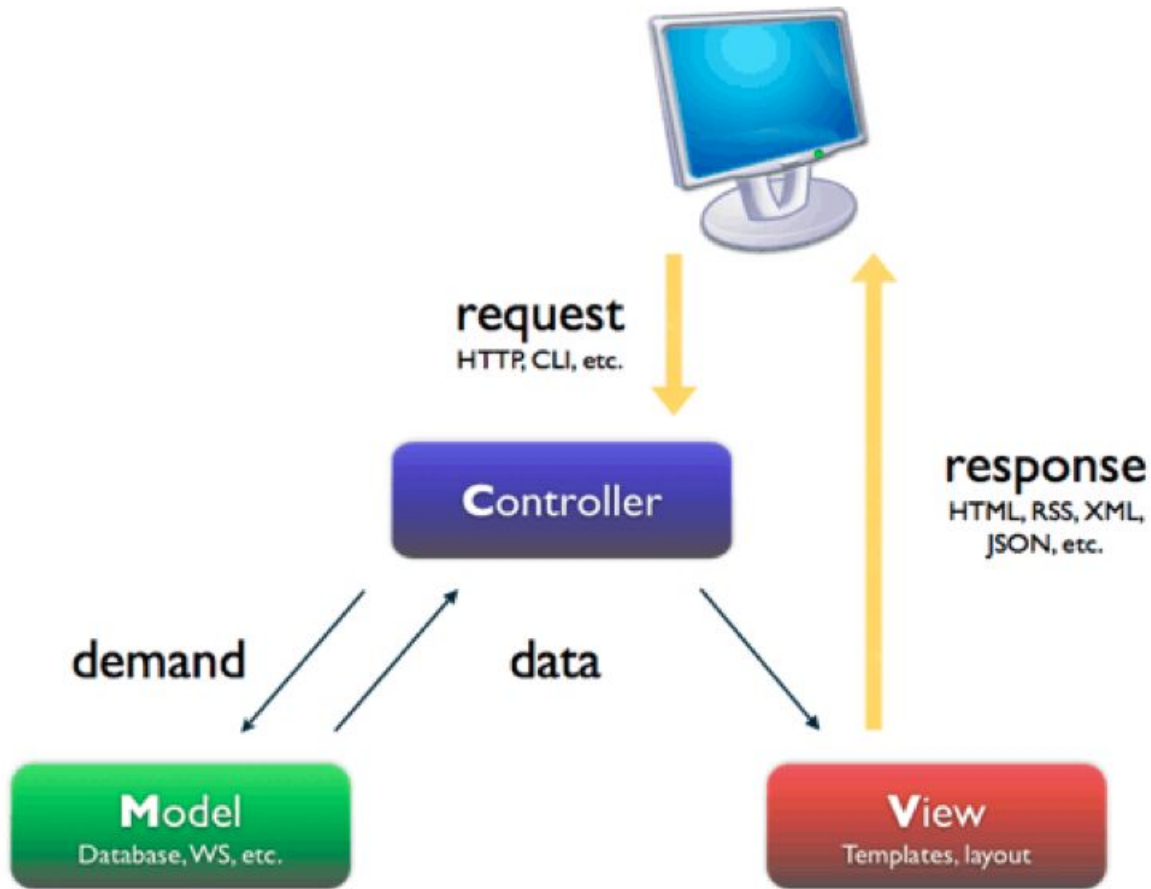
request
HTTP, CLI, etc.

response
HTML, RSS, XML,
JSON, etc.

Controller

demand

data

Model
Database, WS, etc.

View
Templates, layout

symfony.com

Frosh IMs
Intramural Sports
for the class of 2007

Calendar
Champions
FAQ's
Guide to Frosh IMs
Headlines
How to get involved
Photos

Point tallies
Records
Register
Registrants
Rules
Schedules and results
Whom to contact

Headlines

Past headlines

For headlines posted prior to the past seven days, click here.

sessions

Google

Sign in

to continue to Gmail

Email or phone

|

Forgot email?

Not your computer? Use Guest mode to sign in privately.
Learn more

Create account

Next

```
GET / HTTP/1.1
Host: gmail.com

...
```

```
HTTP/1.1 200 OK
Content-Type: text/html

...
```

```
HTTP/1.1 200 OK
Content-Type: text/html
Set-Cookie: session=value
...
```

```
GET / HTTP/1.1
Host: gmail.com

...
```

```
GET / HTTP/1.1
Host: gmail.com
Cookie: session=value
...
```

databases

SQL

```
BLOB
INTEGER
NUMERIC
REAL
TEXT
```

BLOB
INTEGER
    smallint
    integer
    bigint
NUMERIC
REAL
TEXT

```
BLOB
INTEGER
NUMERIC
REAL
   real
   double precision
TEXT
```

```
BLOB
INTEGER
NUMERIC
    boolean
    date
    datetime
    numeric(scale,precision)
    time
    timestamp
REAL
TEXT
```

BLOB
INTEGER
NUMERIC
REAL
TEXT
  char(n)
  varchar(n)
  text

```
CREATE ...
DELETE ...
INSERT ...
SELECT ...
UPDATE ...
...
```

sqlite3

```sql
CREATE TABLE 'registrants'
('id' integer PRIMARY KEY, 'name' varchar(255), 'dorm' varchar(255))

INSERT INTO "registrants" ("id", "name", "dorm")
VALUES(1, 'David', 'Matthews')

SELECT * FROM "registrants"

UPDATE "registrants" SET "name" = 'David Malan' WHERE id = 1

DELETE FROM "registrants" WHERE id = 1

...
```

```
JOIN
WHERE
...
```

PRIMARY KEY
UNIQUE
INDEX
FOREIGN KEY

AUTOINCREMENT

NOT NULL

AVG

COUNT

MAX

MIN

SUM

...

```
db = cs50.SQL("sqlite:///lecture.db")
```

race conditions

```
BEGIN TRANSACTION
COMMIT
ROLLBACK
```

SQL injection attacks

Login required

You may establish Yale authentication now in order to access protected services later.

NetID:

Password:

☐ Warn me before logging me in to other sites.

Login

Please Log In

To log in, please select your login type from the tabs below and enter your credentials. If you're not sure what login type to use, **look here for how you login with HarvardKey.**

HarvardKey	HUID	eCommons	XID

Login Name (in the form of an email address):

me@examplemailprovider.com

Password:

Login

Please Log In

To log in, please select your login type from the tabs below and enter your credentials. If you're not sure what login type to use, **look here for how you login with HarvardKey.**

| HarvardKey | HUID | eCommons | XID |

Login Name (in the form of an email address):

me@examplemailprovider.com

Password:

' OR '1' = '1

Login

```
username = request.form.get("username")
password = request.form.get("password")

db.execute(f"SELECT * FROM users
WHERE username = '{username}' AND password = '{password}'")
```

```
username = request.form.get("username")
password = request.form.get("password")

db.execute("SELECT * FROM users
WHERE username = 'me@examplemailprovider.com' AND password = '' OR '1' = '1'")
```

```
username = request.form.get("username")
password = request.form.get("password")

db.execute("SELECT * FROM users
WHERE username = :username AND password = :password",
username=username, password=password)
```

```
username = request.form.get("username")
password = request.form.get("password")

db.execute("SELECT * FROM users
WHERE username = 'me@examplemailprovider.com' AND password = '\' OR \'1\' = \'1'")
```

xkcd.com/327

C$50 Finance

Symbol	Name	Shares	Price	TOTAL
NFLX	Netflix Inc.	1	$301.78	$301.78
CASH				$9,698.22
				$10,000.00

Data provided for free by IEX. View IEX's Terms of Use.

This is CS50