MAKE SCHOOL

# Templating

WEB 1.1

# Agenda

- Learning Outcomes
- Why Templating?
- Variables in Templates
- Named Parameters
- **BREAK**
- If Statements
- Loops
- Template Inheritance
- Wrap-Up

# Learning Outcomes

By the end of today, you should be able to...

1. **Explain** why templating is important for making our code more elegant & readable.
2. **Use** Jinja2 templates to display variables, conditionals, & list items.
3. **Use** template inheritance to re-use code on multiple pages.

# Check-In

# Check-in

In a group of 3, answer:

What is one thing that is keeping you grounded?

# Review: Why Templating?

# Templating

Let's take a look at some of the code we've written so far.

The route for `/pizza/submit` combines both HTML and Python code.

This has worked well so far, because it keeps everything in one place, but once our projects start to get larger and larger, it's a really bad practice.

What are some **downsides** to having our code in one file?

```
@app.route('/pizza/submit', methods=['GET', 'POST'])
def submit_pizza():
    users_email = request.args.get('email')
    users_phone = request.args.get('phone')
    crust_type = request.args.get('crust')
    pizza_size = request.args.get('size')
    list_of_toppings = request.args.getlist('toppings')
    accepted_terms = request.args.get('terms_conditions')

    if accepted_terms != 'accepted':
        return 'Please accept the terms and conditions and try again!'

    return f"""
    Your order summary: <br>
    Email: {users_email} <br>
    Phone number: {users_phone} <br><br>

    You ordered a {crust_type} crust pizza of size {pizza_size}-inch
    with the following toppings: {', '.join(list_of_toppings)}
    """
```

# Templating

Here are some **downsides** to having **Python** and **HTML** code in the same file:

- There's no syntax highlighting! So it's really hard to see what's going on.
- The code editor can't make autocomplete suggestions, like telling us when an end-bracket is missing.
- It just looks messy!

So... what can we do instead??

```python
@app.route('/pizza/submit', methods=['GET', 'POST'])
def submit_pizza():
    users_email = request.args.get('email')
    users_phone = request.args.get('phone')
    crust_type = request.args.get('crust')
    pizza_size = request.args.get('size')
    list_of_toppings = request.args.getlist('toppings')
    accepted_terms = request.args.get('terms_conditions')

    if accepted_terms != 'accepted':
        return 'Please accept the terms and conditions and try again!'

    return f"""
    Your order summary: <br>
    Email: {users_email} <br>
    Phone number: {users_phone} <br><br>

    You ordered a {crust_type} crust pizza of size {pizza_size}-inch
    with the following toppings: {', '.join(list_of_toppings)}
    """
```

# Templating

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We want to place all of our HTML code for each page into a **separate HTML file**.

This will enforce the convention of **only having one programming language** in a single file, which will make our code cleaner and more elegant!

We'll be using the **render_template** function (built into Flask) to accomplish this.

# Ah, much better!

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## app.py

```python
@app.route('/pizza/submit', methods=['GET', 'POST'])
def submit_pizza():
    accepted_terms = request.args.get('terms_conditions')
    if accepted_terms != 'accepted':
        return render_template('toc_not_accepted.html')

    list_of_toppings = request.args.getlist('toppings')
    context = {
        users_email: request.args.get('email'),
        users_phone: request.args.get('phone'),
        crust_type: request.args.get('crust'),
        pizza_size: request.args.get('size'),
        toppings: ', '.join(list_of_toppings)
    }

    return render_template('submission_page.html', **context)
```

Python code

## templates/toc_not_accepted.html

```html
<p>
    Please accept the terms and conditions and try
again!
<p>
```

## templates/submission_page.html

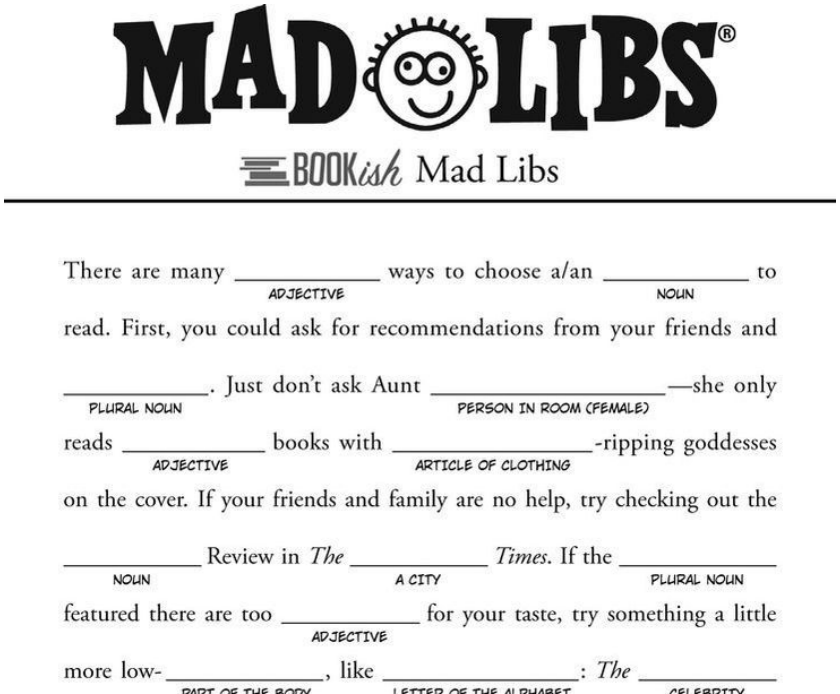
```jinja
Your order summary: <br>
Email: {{ users_email }} <br>
Phone number: {{ users_phone }} <br><br>

You ordered a {{ crust_type }} crust pizza
of size {{ pizza_size }}-inch
with the following toppings: {{ toppings }}
```

HTML code (Jinja2)

# What are Templates?

A template is kind of like a game of MadLibs - we pass variables in from the *route* to be used in the *template*.



MAD LIBS®

BOOKish Mad Libs

There are many _____ ways to choose a/an _____ to
ADJECTIVE NOUN
read. First, you could ask for recommendations from your friends and
_____. Just don't ask Aunt _____—she only
PLURAL NOUN PERSON IN ROOM (FEMALE)
reads _____ books with _____-ripping goddesses
ADJECTIVE ARTICLE OF CLOTHING
on the cover. If your friends and family are no help, try checking out the
_____ Review in *The* _____ *Times*. If the _____
NOUN A CITY PLURAL NOUN
featured there are too _____ for your taste, try something a little
ADJECTIVE
more low-_____, like _____: *The* _____
PART OF THE BODY LETTER OF THE ALPHABET CELEBRITY

# Let’s break it down...

# Jinja2 Templating

The templating language we'll be using is called **Jinja2**. When **render_template** is called, the Jinja2 template tags get **transformed into regular HTML** before being sent to the client.

The **context** variable here is like a suitcase that **packages up variables** to be used in the template.

Jinja2 uses {{ }} syntax to denote using a variable.

app.py

```python
def submit_pizza():
    ...
    context = {
        'users_email': request.args.get('email'),
        'users_phone': request.args.get('phone'),
        'crust_type': request.args.get('crust'),
        'pizza_size': request.args.get('size'),
        'toppings': ', '.join(list_of_toppings)
    }

    return render_template('submission_page.html', **context)
```

templates/submission_page.html

```html
Your order summary: <br>
Email: {{ users_email }} <br>
Phone number: {{ users_phone }} <br><br>

You ordered a {{ crust_type }} crust pizza
of size {{ pizza_size }}-inch
with the following toppings: {{ toppings }}
```

# Jinja2 Templating

Every **key-value pair** in the context gets transformed into a **variable** to be used in the template.

*(Yes, variables are just key-value pairs!)*

app.py

```
def submit_pizza():
    ...
    context = {
        users_email: request.args.get('email'),
        users_phone: request.args.get('phone'),
        crust_type: request.args.get('crust'),
        pizza_size: request.args.get('size'),
        toppings: ', '.join(list_of_toppings)
    }

    return render_template('submission_page.html', **context)
```

templates/submission_page.html

```
Your order summary: <br>
Email: {{ users_email }} <br>
Phone number: {{ users_phone }} <br><br>

You ordered a {{ crust_type }} crust pizza
of size {{ pizza_size }}-inch
with the following toppings: {{ toppings }}
```

# Jinja2 Templating - Named Parameters

We can also pass data using **named parameters**:

app.py

```
def submit_pizza():
    ...

    return render_template('submission_page.html',
        users_email=request.args.get('email'),
        users_phone=request.args.get('phone'),
        crust_type=request.args.get('crust'),
        pizza_size=request.args.get('size'),
        toppings=', '.join(list_of_toppings))
```

templates/submission_page.html

```
Your order summary: <br>
Email: {{ users_email }} <br>
Phone number: {{ users_phone }} <br><br>

You ordered a {{ crust_type }} crust pizza
of size {{ pizza_size }}-inch
with the following toppings: {{ toppings }}
```

# Jinja2 Templating - Named Parameters

Or like this:

app.py

```
def submit_pizza():
    ...
    users_email = request.args.get('email')
    users_phone = request.args.get('phone')
    crust_type = request.args.get('crust')
    pizza_size = request.args.get('size')
    toppings = ', '.join(list_of_toppings)

    return render_template('submission_page.html',
        users_email=users_email,
        users_phone=users_phone,
        crust_type=crust_type,
        pizza_size=pizza_size,
        toppings=toppings)
```

templates/submission_page.html

```
Your order summary: <br>
Email: {{ users_email }} <br>
Phone number: {{ users_phone }} <br><br>

You ordered a {{ crust_type }} crust pizza
of size {{ pizza_size }}-inch
with the following toppings: {{ toppings }}
```

# Jinja2 Templating

Let’s try one more simple example together.

Let’s refactor 1 route in the Jinja Refactor Repl.lt.

# Jinja2 Templating Activity (10 minutes)

Refactor the rest of the routes in the Jinja Refactor Repl.It.

In breakout groups of 2, practice **Pair Programming** as you work through the routes:

- The **Driver** shares their screen & types in the code.
- The **Navigator** tells the driver what to type.
- Switch roles after each route.

# What are Named Parameters?

# Functions

A Python function with "normal" parameters is defined and called like this:

```
def add(num1, num2):
    """Adds two numbers."""
    return num1 + num2

answer = add(6, 7)
print(answer) # prints 13
```

# Naming Parameters

But, we can also "name" the parameters when we call the function, like this:

```
def add(num1, num2):
    """Adds two numbers."""
    return num1 + num2

answer = add(num2=6, num1=7)
print(answer) # prints 13
```

In this case, the parameters don't need to be passed in the same order.

# Accept a List

What if we want to add together any number of values? We could pass the values as a list:

```
def add(numbers):
    """Adds together a list of numbers."""
    result = 0
    for num in numbers:
        result += num
    return result

answer = add([2, 3, 4])
print(answer) # prints 9
```

# *args

But what if, instead of passing a list, we want to pass each number as a separate parameter? We can do that by using ***args**:

```
def add(*args):
    """Adds together any amount of numbers."""
    result = 0
    for num in args:
        result += num
    return result

answer = add(2, 3, 4)
print(answer) # prints 9
```

**We can use "args" as a regular parameter - it contains a tuple of all values passed**

# **kwargs

How about if we want to pass in key-value pairs, instead of individual values?

We can use **keyword args** (or "**kwargs**") to pass these!

```
def print_values(**kwargs):
    for key, value in kwargs.items():
        print(f"{key} = {value}")

print_values(animal='koala', vegetable='eggplant',
    fruit='persimmon')
```

**"kwargs" is a dictionary containing the key-value pairs passed in**

Try it out!

# Keyword Args in render_template

We can also call `render_template` and pass in variables as keyword args:

```
@app.route('/profile')
def my_profile():
    return render_template('profile.html',
        first_name='Meredith',
        hobbies=['cooking', 'knitting', 'hacking'])
```

Then use them in the template like:

```
<!-- profile.html -->
<p> My Name: {{ first_name }} </p>

<p> My Hobbies: {{ hobbies }} </p>
```

# Keyword Args in render_template

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You can also pre-define the variables and pass them in like this - keep in mind that the left side is the "new" name (what you'll call it in the template), and the right side is the value.

```
@app.route('/profile')
def my_profile():
    first_name = 'Meredith'
    hobbies = ['cooking', 'knitting', 'hacking']

    return render_template('profile.html',
        first_name=first_name, hobbies=hobbies)
```

# Break - 10 min

# Jinja2 If Statements

# If Statements

Sometimes, we want to show something different in a template depending on the value of a variable.

Let's say we have an **Animal Facts** web page and we want to show a different fact for each animal.

We could have an **if/elif/else** statement in the Python code to determine which animal fact to show... **or** we could do it in the template!

# If Statements

Here's what the code might look like.

## app.py

```
@app.route('/fact/<animal>')
def animal_fact(animal):
    """Shows one fact about the given animal."""
    context = {
        'animal': animal
    }
    return render_template('fact.html', **context)
```

## templates/fact.html

```
{% if animal == 'aardvark' %}
   Aardvarks can eat up to 50,000 insects each night! They
swallow their food whole, without chewing it.
{% elif animal == 'penguin' %}
   A penguin's black and white plumage serves as camouflage while
swimming.
{% elif animal == 'zebra' %}
   A zebra's stripes serve to dazzle and confuse predators and
biting insects.
{% else %}
   I don't have any facts about that animal. Please try again!
{% endif %}
```

*If the user goes to /fact/koala, what will they see?*

# If Statements

An if statement in Jinja2 looks like this:

```
{% if boolean expression %}

   If the first statement is true, this HTML will be displayed!

{% elif other boolean expression %}

   If the first statement is true, this HTML will be displayed!

{% else %}

   If neither is true, this HTML will be displayed!

{% endif %}
```

Just like in Python, the *elif* and *else* clauses are optional.

# If Statements

With a partner (Pair Programming style), complete the [If Statements Repl.it]() by filling in the missing code in `templates/coin_flip.html`.

Some Flask Repl.it tips:

- If you see “Hmm.... We Couldn’t Reach Your Repl”, click “Stop” followed by “Run”.
- You can also click the icon to open in a new tab.
- Collect more tips to help out your classmates!

# Jinja2 Loops

# Loops

Sometimes we want to show an HTML element, or several elements, *multiple times* in one web page.

Instead of writing out the same code many times, we can use a *for loop* to accomplish this!

# Loops

Here's an example of a Jinja2 for loop in action! *What will we see rendered on the page?*

app.py

```
@app.route('/compliments')
def get_compliments():
    """Gives the user some compliments."""
    compliments = [
        'brave',
        'witty',
        'tenacious'
    ]
    context = {
        'compliments': compliments
    }

    return render_template('compliments.html', **context)
```

templates/compliments.html

```
Hello there, user! You are so...

<ul>
{% for compliment in compliments %}
    <li> {{ compliment }} </li>
{% endfor %}
</ul>
```

# Let’s break it down!

Recall that the only variables available in the template are the ones added into the context - that is, `compliments_list`.

BUT, the for loop creates a new variable, `compliment`!

app.py

```
def get_compliments():
    ...

    return render_template(
        'compliments.html',
        compliments_list=compliments)
```

templates/compliments.html

```
Hello there, user! You are so...

<ul>
{% for compliment in compliments_list %}
    <li> {{ compliment }} </li>
{% endfor %}
</ul>
```

# Loops

A loop in Jinja looks like:

```
{% for new_variable_name in list %}

   This HTML will be repeatedly displayed for each item in the

list. Each time the loop runs, {{ new_variable_name }} will

refer to a different item in the list.

{% endfor %}
```

# Loops

With a partner (Pair Programming style), complete the Loops Repl.it by filling in the missing code in `templates/shopping_list.html`.

Some Flask Repl.it tips:

- If you see “Hmm.... We Couldn’t Reach Your Repl”, click “Stop” followed by “Run”.
- You can also click the icon to open in a new tab.

# Template Inheritance

# Templating Exploration Activity (10 minutes)

- Click on this web page and this one.
- List at least **3 things that are the same** and **3 things that are different** between the **layouts** of the two web pages. (Example: Both pages include a search bar.)
- Type your answer in the chat!

# Templating

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**Same**

- Nav bar
- Footer
- Styles

**Different**

- Content
- Etc...

# Why Templating?

In the programming world, there is a concept called

**D**on't

**R**epeat

**Y**ourself

which means, don't write the same code twice.

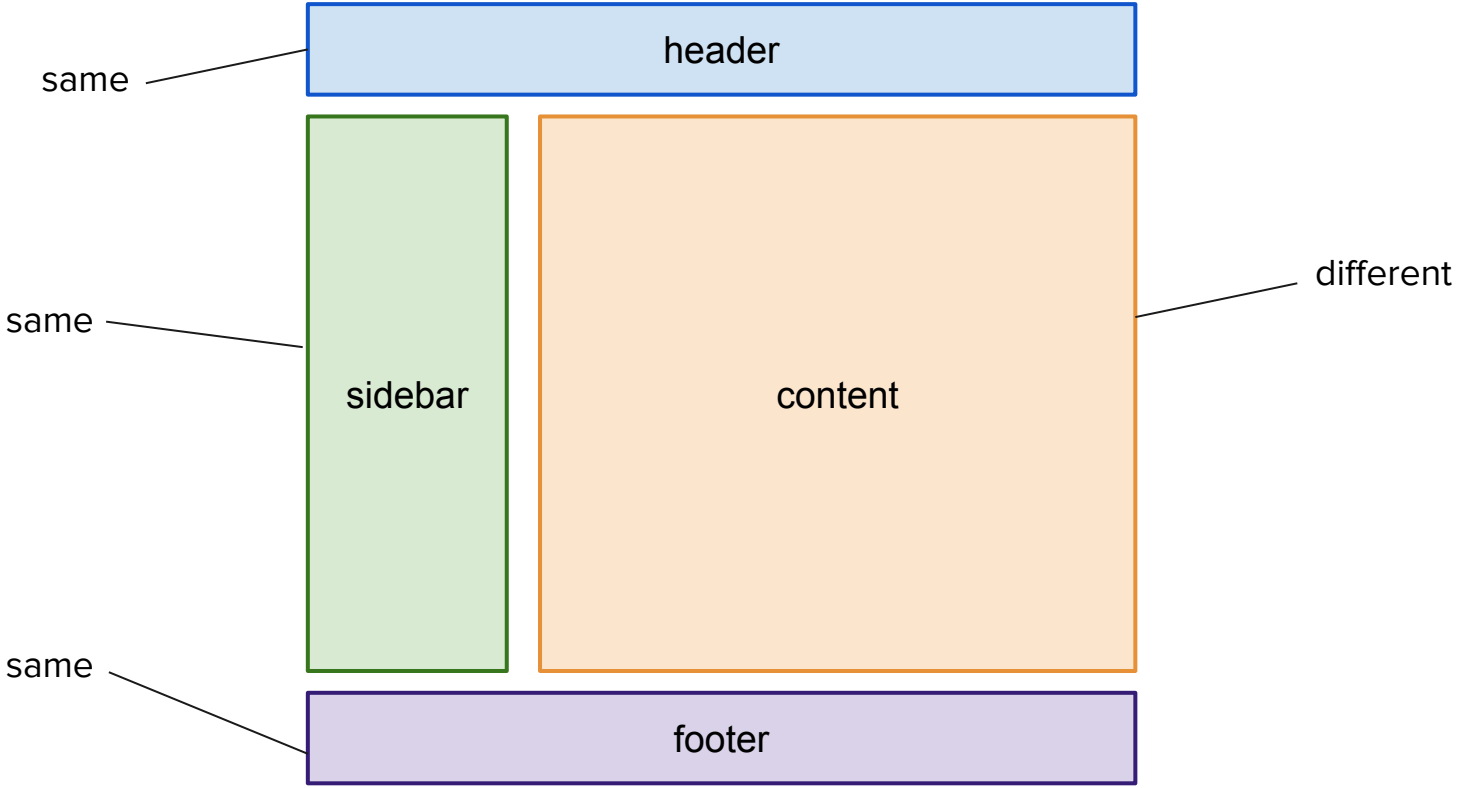
How does that concept relate to the web pages we just explored?

# Templating

It is very common to have parts of a web page that are re-used for every page on the website: header, sidebar, footer, etc.

We can use **template inheritance** to easily reuse parts of a web page in multiple places.

# Templating



# Templating

We can use the `{% block %}` and `{% extends … %}` tags to inherit from a base template.

templates/base.html

```
<!DOCTYPE html>
<html>
   <head>
       <title>
           {% block title %}{% endblock %}
       </title>
   </head>
   <body>
       <header>
           ...
       </header>

       <main>
           {% block content %} PLACEHOLDER TEXT {% endblock %}
       </main>

       <footer>
           ...
       </footer>
   </body>
</html>
```

templates/index.html

```
{% extends 'base.html' %}

{% block title %}
   My Pizza Delivery App
{% endblock %}

{% block content %}
   Welcome! Here is the place where you order pizza.
{% endblock %}
```

# Templating

Fill in the blanks to complete the `index.html` template!

## templates/pizza_base.html

```
<!DOCTYPE html>
<html>
    ...
    <body>

        <main>
            Please fill out the following form to order your
pizza.
            {% block pizza_form %}{% endblock %}
        </main>

    </body>
</html>
```

## templates/index.html

```
{% extends                    %}

{% block            %}
    <form action="/pizza_submit">
        Select your pizza crust:
        ...
        <input type="submit" value="Submit">
    </form>
{% endblock %}
```

# Templating

Fill in the blanks to complete the `index.html` template!

## templates/pizza_base.html

```
<!DOCTYPE html>
<html>
    ...
    <body>

        <main>
            Please fill out the following form to order your
pizza.
            {% block pizza_form %}{% endblock %}
        </main>

    </body>
</html>
```

## templates/index.html

```
{% extends 'pizza_base.html' %}

{% block pizza_form %}
    <form action="/pizza_submit">
        Select your pizza crust:
        ...
        <input type="submit" value="Submit">
    </form>
{% endblock %}
```

# Templating

With a partner (Pair Programming style), complete the Template Inheritance Repl.it by filling in the missing code in `templates/home.html`.

# Lab Time: Homework 2

# Lab Time

Homework:

- Quiz 1 - study guide is posted; take-home quiz will be available by eod Friday
- Finish up homework 2
- Homework 3 will be posted by ~9pm tonight!

# Resources

- Templates - Flask Tutorial
- (Beginner-friendly) Video Tutorial on Templates