Lab 5
React Basics

CSCI2720 Building Web Applications

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Agenda

- Tools to prepare
- Hello World!
- Component by component
- Looping through an array
- Optional materials:
  - Events and states
  - Conditional rendering

Tools to prepare

- You need to get these ready
  - Google Chrome
  - React Developer Tools
    - https://chrome.google.com/webstore/detail/react-developer-tools/fmkadmapgofadopljbjfkapdkoienihi
  - Web Server for Chrome
    - Otherwise you'll run into CORS issues

Hello World!

- Start with the given zip file here
  http://www.cse.cuhk.edu.hk/~chuckjee/2720lab5/lab5.zip
  - **`index.html`**
    - React, ReactDOM, Babel, and Bootstrap are already included
  - **`images`**
    - Some nice pictures of CUHK to showcase in your React app later
- You need to prepare a JSX file `app.jsx` in the same directory
  - The names of `app.jsx` and `#app` in the HTML are arbitrary
  - You could use any name you wish in your own development

Hello World!

- In `app.jsx`, you only need one statement now for testing:

```
const root = ReactDOM.createRoot(
document.querySelector("#app"));
root.render( <h1>Hello World</h1> );
```

  - This is the "entry point" of the React app
- Save the file and view the HTML via Web Server for Chrome (http://localhost:8887)
- Check out the Developer Tools with the new React tabs, *Components* and *Profiler*
  - There is *no component* yet

The first component

- Now, put this into your jsx file

```
class App extends React.Component
{
render() {
      return <h1>Hello World</h1>;
   }
}
```

- And adjust your `root.render()` line to

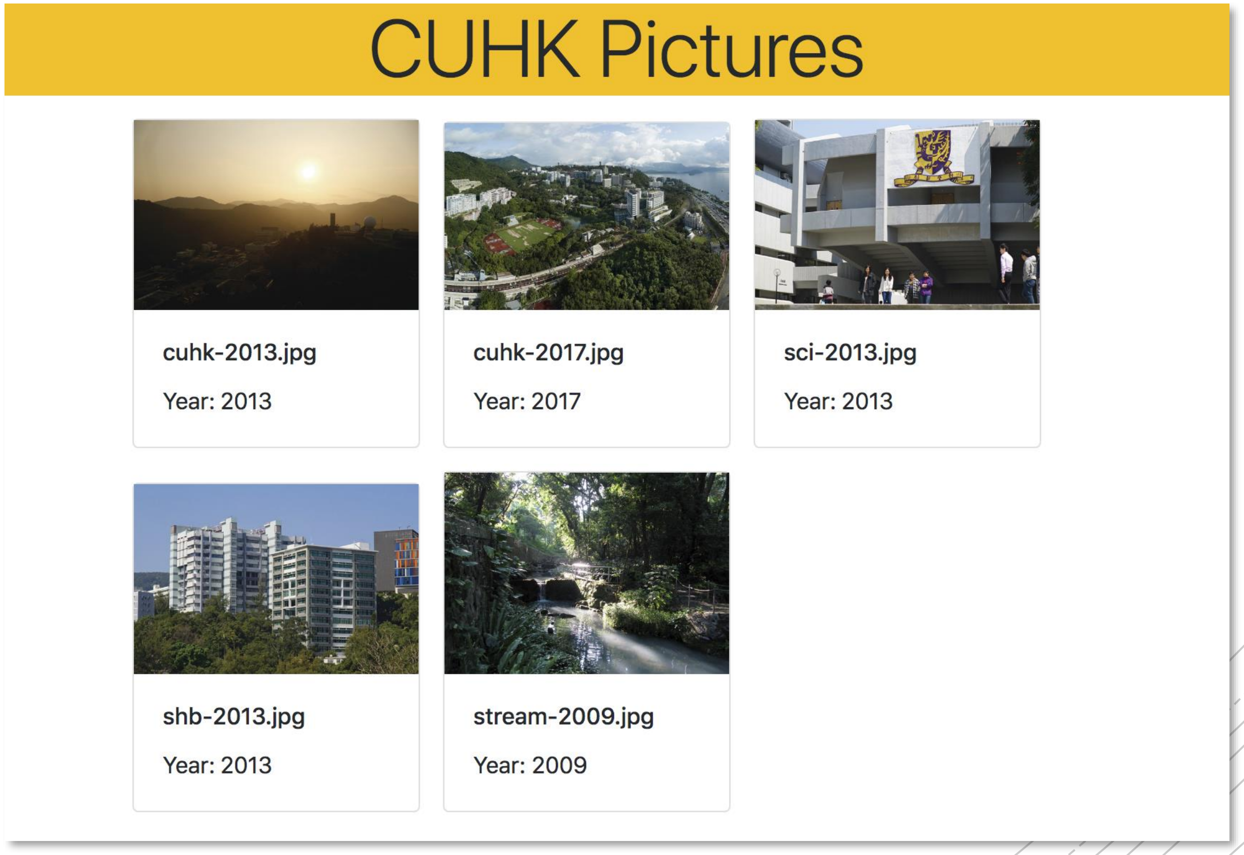
```
root.render(<App />);
```

  - This line must come after the definition of the **App** class, otherwise **`<App/>`** cannot be found

- This time, you should be able to see the component ***App*** with no props nor states

Now let's start with the real app

- Our goal looks like this:



CUHK Pictures

cuhk-2013.jpg

Year: 2013

cuhk-2017.jpg

Year: 2017

sci-2013.jpg

Year: 2013

shb-2013.jpg

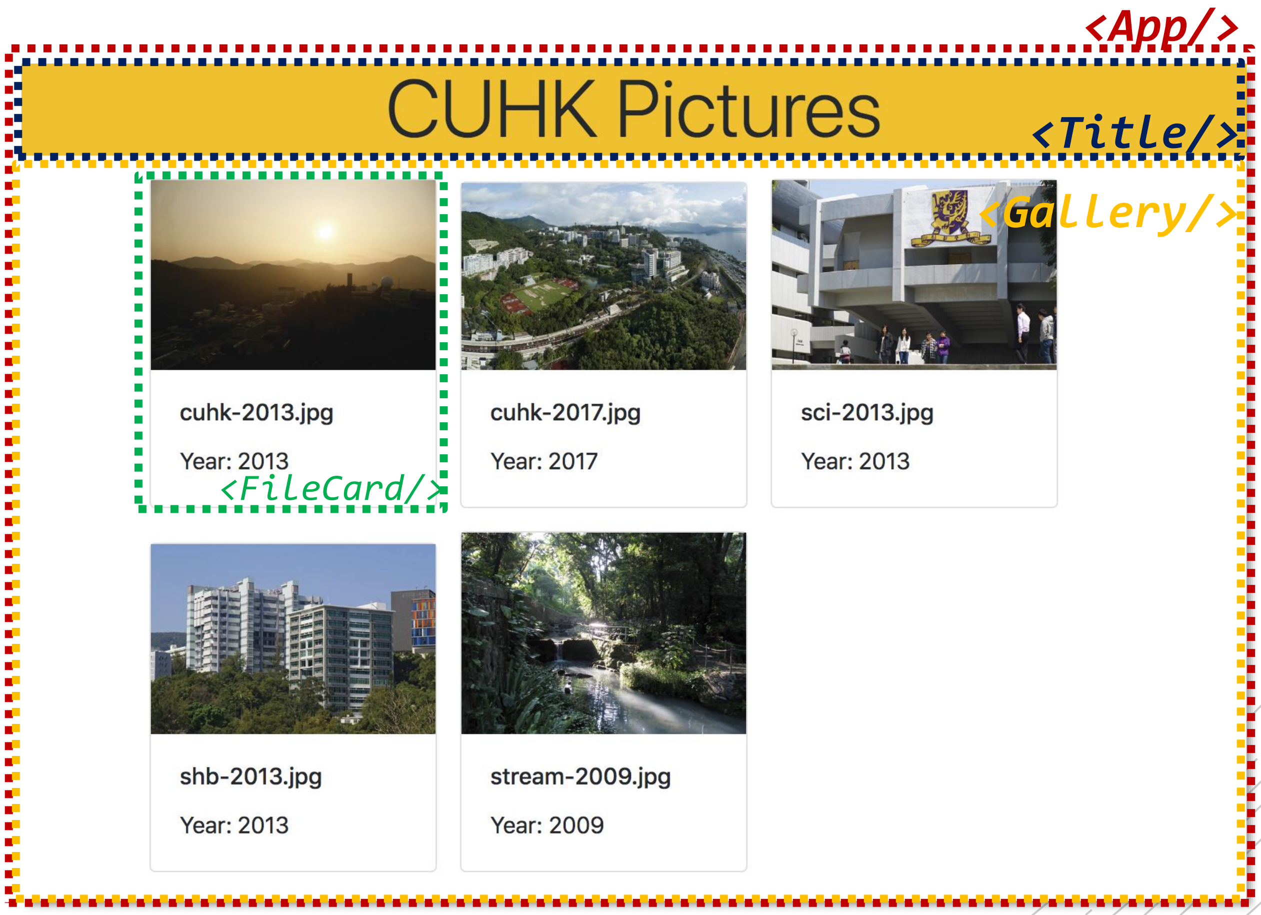
Year: 2013

stream-2009.jpg

Year: 2009

Now let's start with the real app

- You need to divide your app into components and build them one by one



The <App/> component

- Use this code for your class App

```
class App extends React.Component {
  render() {
    {/* <> fragment for >1 components */}
    return (
      <>
        <Title name={this.props.name}/>
        <Gallery />
      </>
    );
  }
}
```

  - Note the special JSX comment syntax
- The `name` props comes from an “attribute” setting in the parent:

```
root.render(<App name="CUHK Pictures"/>);
```

  - You only need ONE line of `root.render()`, so add the needed attribute by editing but not adding an extra one!
- You can’t see the results yet, as `Title` and `Gallery` are not yet defined…

The <Title/> component

- The **`Title`** component inherits the `name` props from **App** (passing by parent)
- Here the styling is done with Bootstrap classes
  - Note: use `className` instead of `class` for the CSS classes!

```
class Title extends React.Component {
  render() {
    return (
      <header className="bg-warning">
        <h1 className="display-4 text-
center">{this.props.name}</h1>
      </header>
    );
  }
}
```

The <Gallery/> component

- The **Gallery** component is merely a container for the contents we build later
- We better put some debugging text here before moving on

```
class Gallery extends React.Component {
  render() {
    return (
      <main className="container">
        Is this okay?
      </main>
    );
  }
}
```

- Now refresh your page in Chrome, and you should be able to see the skeleton rendered
  - More components are seen under *Developer Tools » Components*

Preparing the data

- Set up a simple data variable for the file information
  - *Hardcoding isn't a good idea for actual production!*

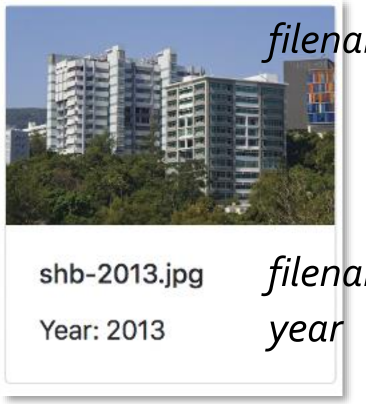
```
const data = [
  {filename: "cuhk-2013.jpg", year: 2013, remarks: "Sunset over CUHK"},
  {filename: "cuhk-2017.jpg", year: 2017, remarks: "Bird's-eye view of CUHK"},
  {filename: "sci-2013.jpg", year: 2013, remarks: "The CUHK Emblem"},
  {filename: "shb-2013.jpg", year: 2013, remarks: "The Engineering Buildings"},
  {filename: "stream-2009.jpg", year: 2009, remarks: "Nature hidden in the campus"},
];
```

  - An array of objects
  - This global **`const`** variable should be in the top of the file

Bootstrap cards

- We would like to show each image as a Bootstrap card
  - *Ref*: [*https://getbootstrap.com/docs/5.2/components/card/#images-1*](https://getbootstrap.com/docs/5.2/components/card/#images-1)
  - For one card (e.g., `data[0]`, the structure would be

```
<div className="card d-inline-block m-2"
style={{width:200}}>
  <img src={"images/"+data[0].filename}
className="w-100" />
  <div className="card-body">
    <h6 className="card-title">
{data[0].filename}</h6>
    <p className="card-text">
{data[0].year}</p>
  </div>
</div>
```


shb-2013.jpg

Year: 2013

  - *Note: mind the special closing of* `<img/>`
- Try and render this one `<FileCard/>` in `<Gallery/>`

Looping through the data array

- To show all images, loop through the array in <Gallery/>
  - `.map()` is an efficient way to generate the result
    - `array.map( (value,key) => (every output) );`
- Inside `<main>` in `<Gallery/>`, use this to render multiple `<FileCard/>` components:

```
{data.map((file,index) => <FileCard i={index}
key={index}/>)}
```

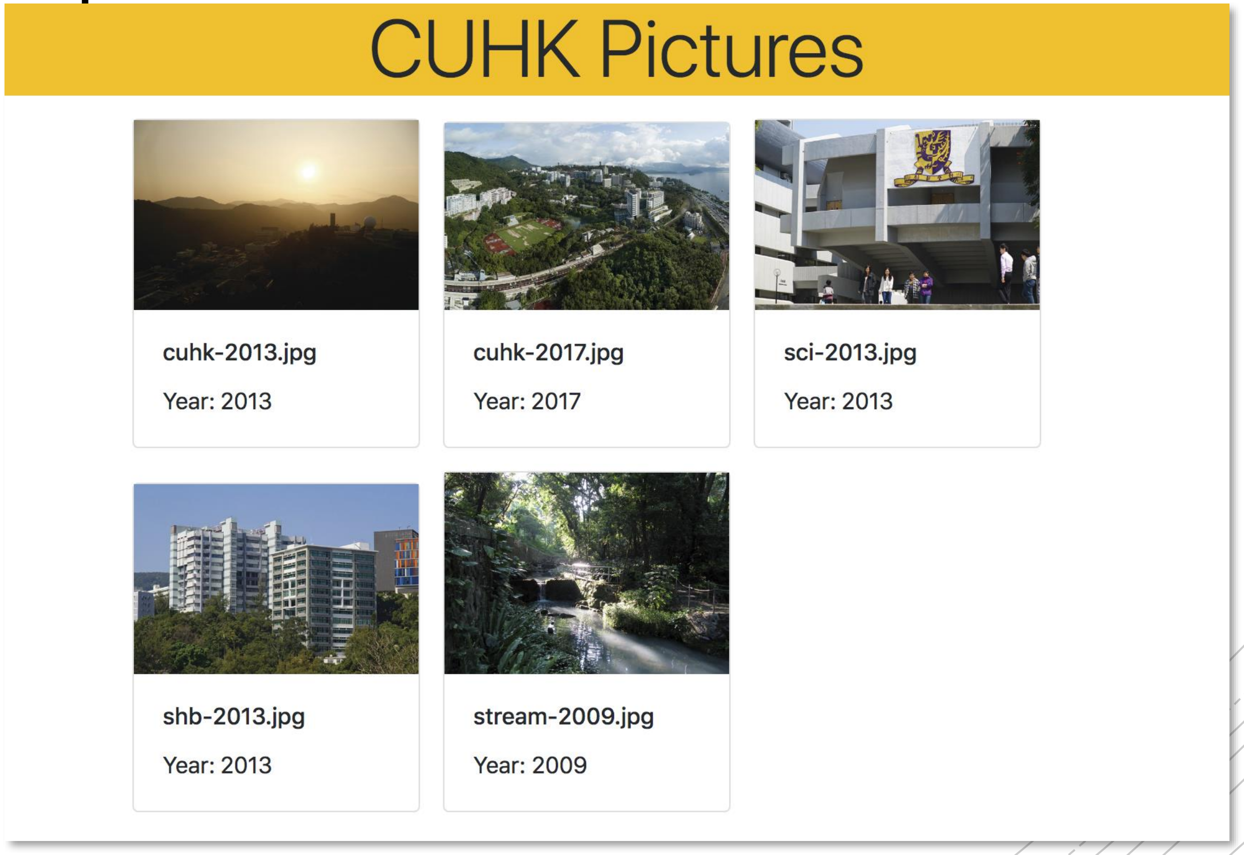
  - `key={index}` allows React to identify the elements in the ReactDOM for efficient re-rendering
- Adjust your `render()` code in `<FileCard/>` to be

```
render() {
    let i = this.props.i;
    return (
<div className="card d-inline-block m-2"
style={{width:200}}>
  <img src={"images/"+data[i].filename}
className="w-100" />
... // and so on, with data[i] instead of data[0]
}
```

- You need to be extremely careful with the syntax

Careful output

- You should result at such a nice showcase of CUHK pictures



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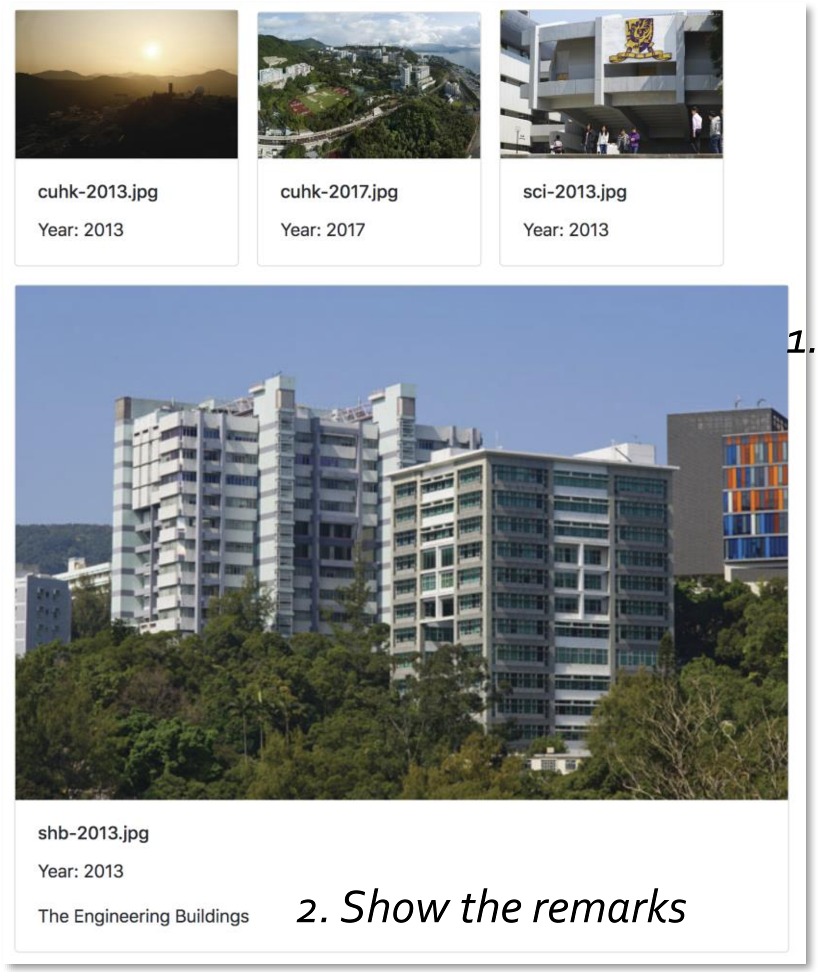
Year: 2009

Submission

- No submission is needed for labs
- What you have done could be useful for your further exploration or the upcoming assignment
- **Please keep your own file safely**

Handling events

- Let's do these when the user clicks on an image…



cuhk-2013.jpg

Year: 2013

cuhk-2017.jpg

Year: 2017

sci-2013.jpg

Year: 2013

shb-2013.jpg

Year: 2013

The Engineering Buildings

1. width: 100%

2. Show the remarks

Handling events

- Set up an event handler *inside* <FileCard/>

```
class FileCard ... {
  handleClick() {
    console.log("clicked");
  }
  render () …
```

- And put the `onClick` handler in the card div

```
onClick={this.handleClick}
```

  - *The name handleClick isn't important as long as they match*

- Are you able to see a message when clicking?
- However, since we want to send the index (`i`) too, you need to use this for `onClick`

```
onClick={(e) => this.handleClick(i,e)}
```

- And adjust the event handler

```
handleClick(index, e) {
  console.log(index);
}
```

- Are you able to see the index printed when clicking?

Using states

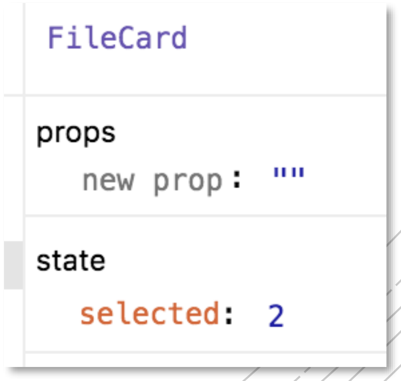
- To use states, you need to set it up in the class constructor of <FileCard/>

```
constructor(props) {
    super(props);
    this.state = { selected: -1 };
    {/* this syntax should only be used
     in the constructor, and otherwise
     this.setState() must be used */}
  }
```

- In the event handler, you could do this (with proper JavaScript!) with `this.setState()`

```
If this.state.selected is not i
  set selected state to i
Else
  set selected state to -1
```

- Now, when clicking the cards you can see a change in the developer tools



```
FileCard
props
  new prop: ""
state
  selected: 2
```

Conditional rendering

- There are different ways to render conditionally in React
- Using ternary operator **? :**

```
style={{width:
this.state.selected==i ? '100%' :
200}}
```

- Using logical operator **&&**

```
{ this.state.selected==i && <p
className="card-
text">{data[i].remarks}</p> }
```

- And sometimes you can use traditional if-else statements too if not inside a JSX statement

You've done it!

- This is a very simple React app you have built
- Observe carefully how ***responsive*** and ***interactive*** it can be
- Use React developer tools to check how the props and states are passed or changed