Internet Data Streams

Presentation Intro

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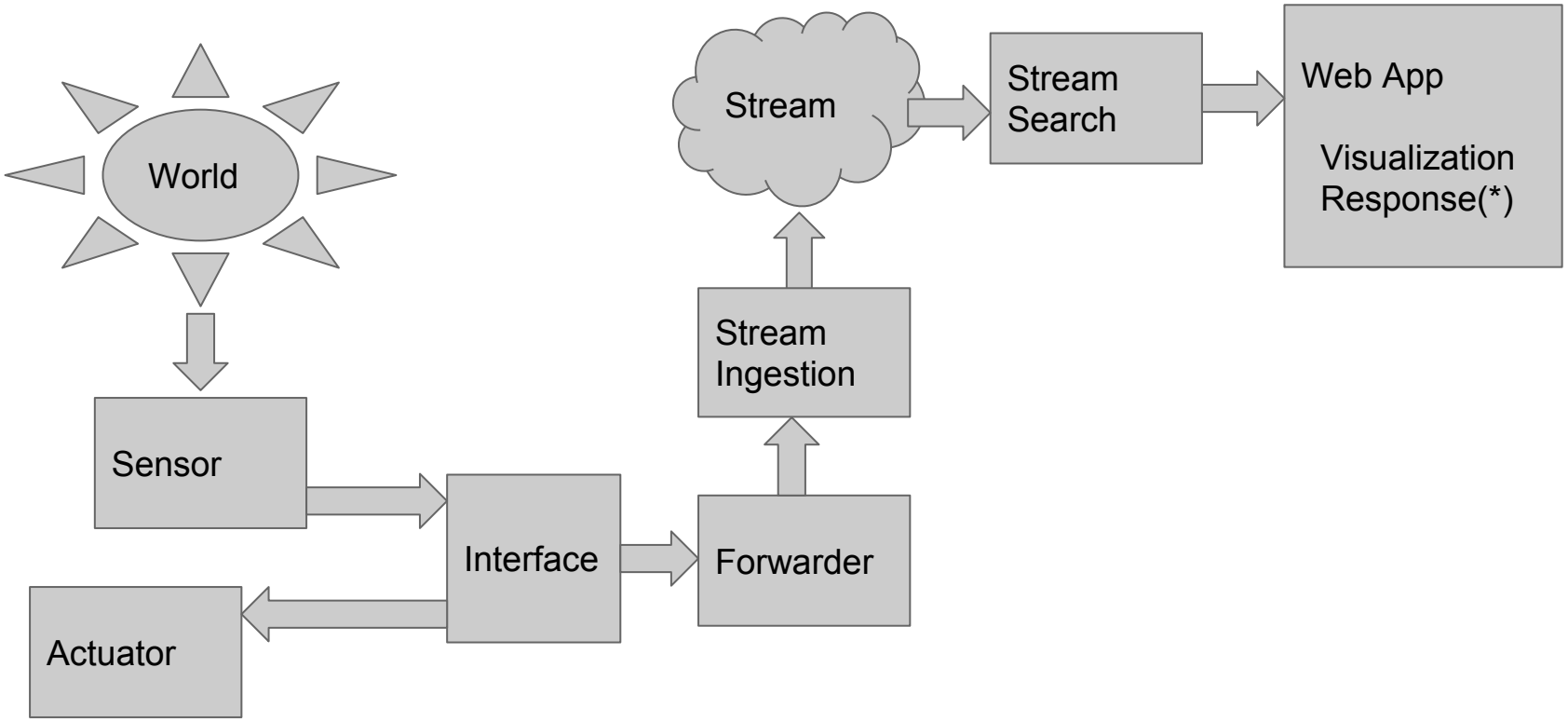
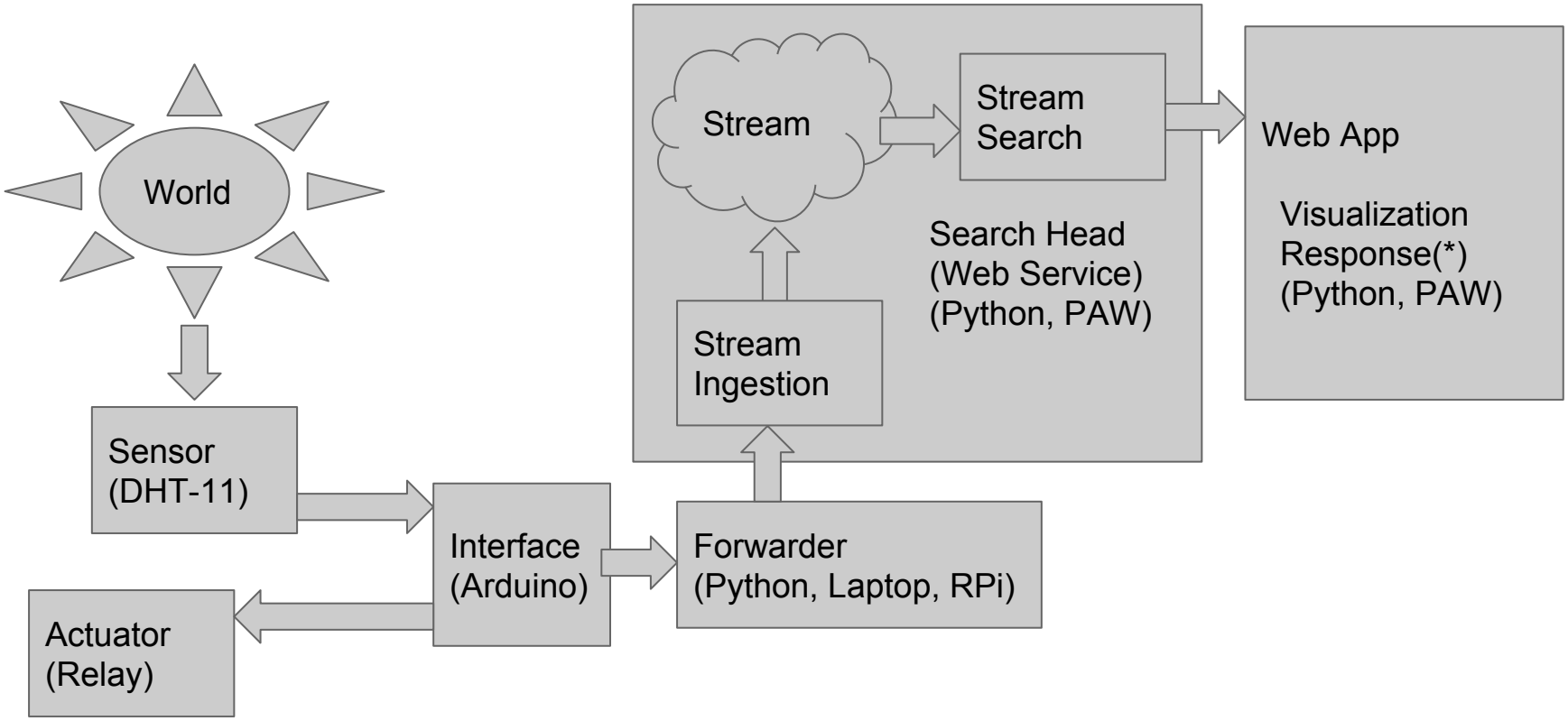
Architecture



Architecture



Tasks

- DHT sensor library
- Integrate DHT into Arduino Sensor Utility
- Updates to Forwarder
- Streamer/search head
- Web App for simple presentation
- Web App for visualization
  - Charts
  - Maps

Review: Data Streams

- *Multiple inputs*.
- *Single output*
- *Asynchronous*
- *JSON data*

Review: About HTTP requests

- Types of requests
  - Get
  - Post
    - (Submissions)

- "curl" command line utility
- Python "requests" library

Review: Open Weather Data

- Go to “openweathermap.org”
- Sign up for the free plan (or not…)
- Use URL requests to get the data

- Use 'requests' library in Python to do that

Review: Data Streams, continued

- We want shared input for lots of "devices"
- Use URL requests to insert the data
    - http://<url>/store/<stream_name>?x=a&y=1.1
    - require lat, lon, user, temp, humidity, city

Review: Data Streams, continued

- We want one output for all uses
- Use URL requests to get the data as JSON
- Use 'requests' library in Python to do that
  - http://<url>/query/<stream_name>?x=a&y=1.1
    - &start_time=1500412651
    - &end_time=1500412651

Review: Creating a Data Stream

- API at drdelozier.pythonanywhere.com
- soon: http://streams.pythonanywhere.com

- You can create a stream by naming it
- You can read any stream you know about
- We will be implementing write keys

Reading the Data Stream

- Data stream can be read with *requests*
- Requests can be called from a web app
  - Server side calls
  - Send results to web page
  - Templates make this easy

- Demo Time: a bottle.py web app

Data Presentation

- Getting the collected data
- Extracting data of interest
- Presenting the data in as tabular data
- Presenting the data visually

Getting the collected data

- Collecting data with "requests"
- Feeding the data to a template

Displaying the data

- Displaying the data as a list
- Displaying the data as a table
- Refreshing the data

Data Visualization

- Present understandable current state
- Present changes in state over time
- Facilitate understanding of relationships
- Facilitate model-making
- Facilitate predictions based on models

Creating a web application

- Serving a web page
  - We will use bottle.py, locally and on pythonanywhere
  - http://bottlepy.org/docs/dev/index.html

- Serving a templated page
  - We will use a templated document
  - http://bottlepy.org/docs/dev/stpl.html

Visualization Examples

- Let's look at some bad examples
  - Why they are bad?
  - What story are they trying to tell?
  - How could they have been improved?

  - https://www.google.com/search?q=data+visualization+bad+examples
  - http://www.quora.com/What-are-examples-of-bad-data-visualization-thats-misleading-and-confusing

Visualization Examples

- How about some good examples?
  - What makes them good?
  - What story are they trying to tell?
  - Is the story understandable?

  - https://www.google.com/search?q=data+visualization+good+examples

Creating a chart

- *Temperature stream over time*
- *Use Google Charts*
- *Demo Time*

  - *https://developers.google.com/chart/*
  - *https://developers.google.com/chart/interactive/docs/gallery/linechart*

Break Time

This Week's Lab (Continued)

- Create a stream
  - http://drdelozier.pythonanywhere.com
  - Work with 3-4 people
- Have programs fill the stream
- Read the stream with a webapp
- Display the stream programmatically
- Display a stream graphically (class stream)
  - Make a chart to graph temp and humidity over time
  - Compute and add heat index

Creating a map

- *Temperature stream with lat/lon*
- *Use Google Maps*

Basic Map Exercise

- Tutorial here, to get started:
  - http://www.google.com/earth/outreach/tutorials/mapseng_lite.html
- We will do the web version in the lab
  - https://developers.google.com/maps/tutorials/
- Bring your laptops on Wednesday

See you next time!