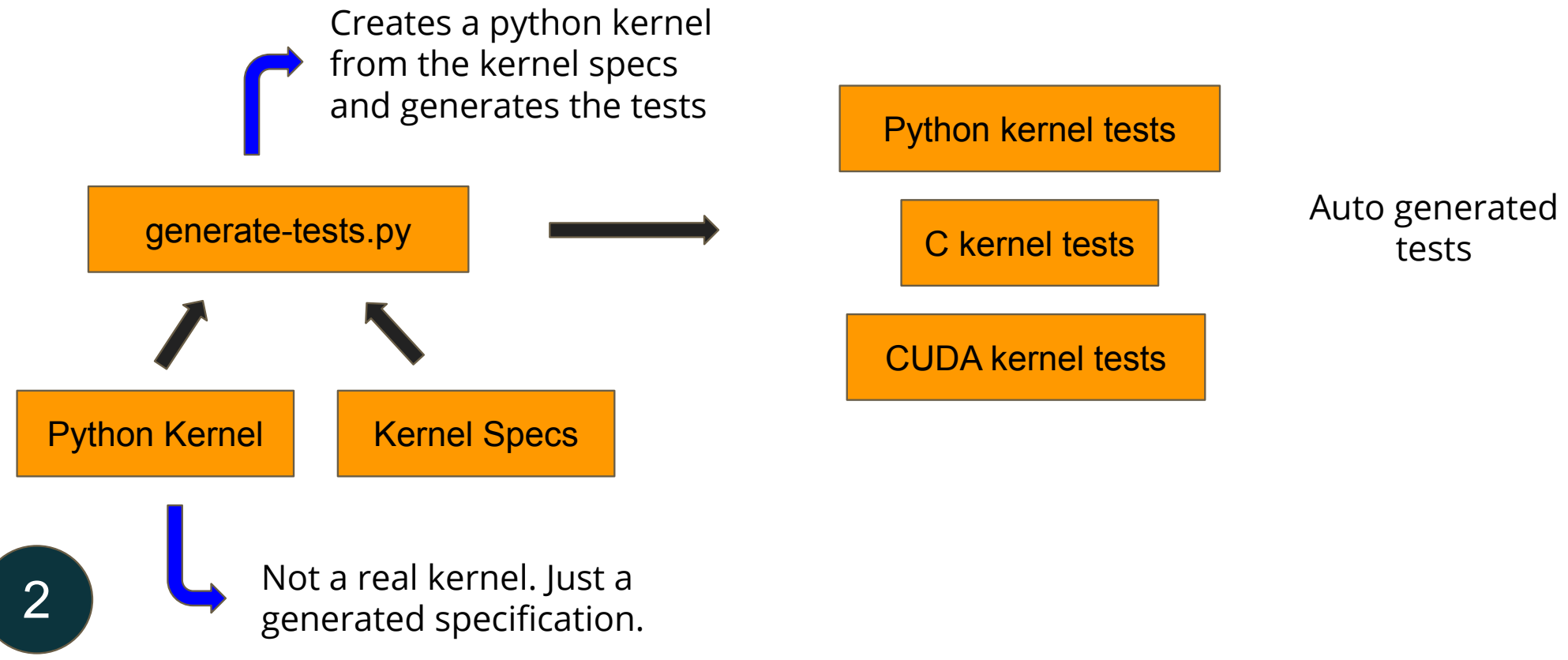
Automating Awkward Array Testing

Santam Roy Choudhury
(National Institute of Technology, Durgapur)

Mentored By: Ianna Osborne and Jim Pivarski

The Current Testing Infrastructure



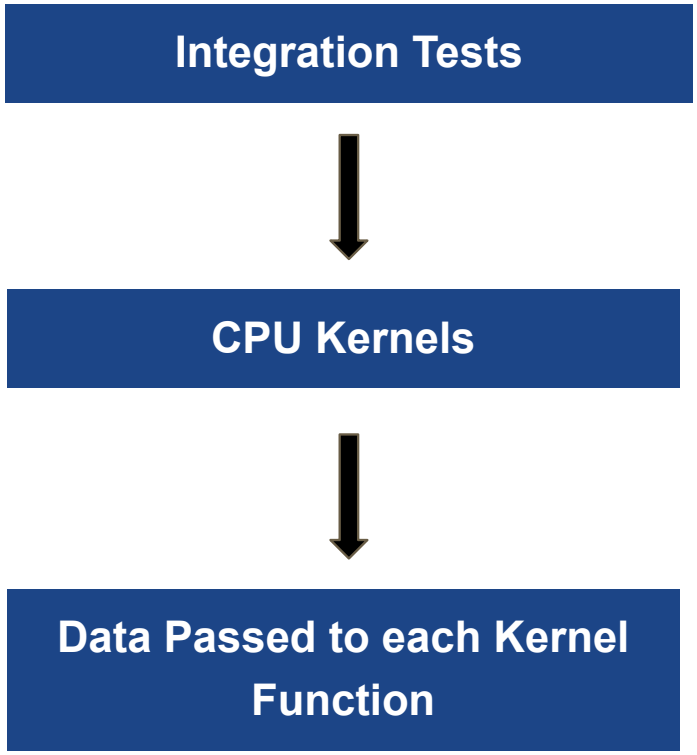
What are some of the loopholes here?

- Not too many specific test cases
- Not testing for specific errors
- The roles of the arguments are not well defined

Objectives of the Project

- Get more test data
- Store the data in a computer readable format (Yaml)
- Automate the process to generate tests from these data

The Test Data Generation Approach



Calls the CPU Kernels at run time

Processing of the Raw Data

- Getting each arguments for each kernel function from the pool of raw data
- Getting the data for each argument correct and cleaning them of special characters or enormously large number
- Cleaning the data from unwanted numbers but keeping the length of the lists correct in the arguments.
- Mapping the processed data onto a yaml file.

The yaml Format

```yaml
unit-tests:
- name: awkward_Identities_getitem_carry
  tests:
  - error: false
    inputs:
      carryptr: [0, 0, 0, 0]
      identitiesptr: [0, 1]
      lencarry: 4
      length: 2
      width: 1
    outputs:
      newidentitiesptr: [0, 0, 0, 0]
  - error: false
    inputs:
      carryptr: [0, 1, 1, 1]
      identitiesptr: [0, 1]
      lencarry: 4
      length: 2
      width: 1
    outputs:
      newidentitiesptr: [0, 1, 1, 1]
```

Separating Tests from Kernel Specifications

The Results

Data for 123 out of 143 Kernel Functions

2673 Unique Test Cases in Total

Future Development Plans

Analyse the tests to look for bugs in the existing codebase.

Use the tests for development of the CUDA Kernel (Test Driven Development)

Things I learned from the Project

Best Practices for writing Unit Tests

Got introduced to some python libraries- Pytest and Hypothesis

Best Practices for preparing a presentation for a conference

Gave a Talk at PyHep

https://youtu.be/dcuZqdCwpYM

Thank You!!

https://github.com/SantamRC

santamdev404@gmail.com