



Phylanx & Related

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Working Docker Environment

An environment for developing Phylanx

- ▶ Docker://stevenrbrandt/devenv:working
 - ▶ Includes Apex (OTF, Active Harmony, PAPI)
 - ▶ Includes Python 3.6.8 (Tensorflow, Keras, CNTK)
 - ▶ Tensorflow
- ▶ At most 3 failing Phylanx tests
- ▶ Compiled for 80 cores
- ▶ Singularity image on Rostam
- ▶ Support for Phylanx (Blaze, Blaze_Tensor, Pybind11)
- ▶ Build.sh script.



Teaching Support

- Jupyterhub environment
- **Cling** – Latest build of CERN's C++ interpreter
 - C++ Notebook with minor extensions, e.g. %%writefile.
 - %%cling magic interface.
 - Support for running HPX in cling's environment.
- **@Pyll** decorator
 - An alternate way to interactively develop C++
 - Doc string is C++ code that compiles and interfaces to Python.
- CCT Class taught with Patrick Diehl.



Help System for Phylanx

- ▶ **Physl -doc** lists all components known to Phylanx
- ▶ **Phyhelp()** displays docs
- ▶ A correctly formatted doc string is required to submit a new component



Components added to Phylanx

- **Binary_crossentropy()** – Keras support
- **Categorical_crossentropy()** – Keras support
- **__type()** – Index into the variant type used by Phylanx
- **__name()** – string rep of the variant type used by Phylanx
- **Sign()** – Changed Blaze behavior for NaN
- **Square()**





HPX Component Maker

- ▶ The problem: Normally, about 5 to 10 lines of code need to be updated whenever a function is added/modified
- ▶ The solution: Create an HPX component from a Python file
- ▶ <https://github.com/stevenbrandt/HPXCompMaker.git>
- ▶ An additional benefit is that pybind11 bindings are made for the component.

```
@Component(namespace='adder')  
class Adder:
```

```
    counter : int = 0
```

```
    def add(self, val : int) -> None:  
        "counter += val;"
```



Distributed Garbage Collection

- ▶ Theoretical ground work published in 2018
 - ▶ Decentralized
 - ▶ Based on Actor Model (does not stop the world)
 - ▶ Time complexity is linear in the number of edges
- ▶ Some coding has been done
- ▶ Prompted the HPX Component Maker project