openDIEL

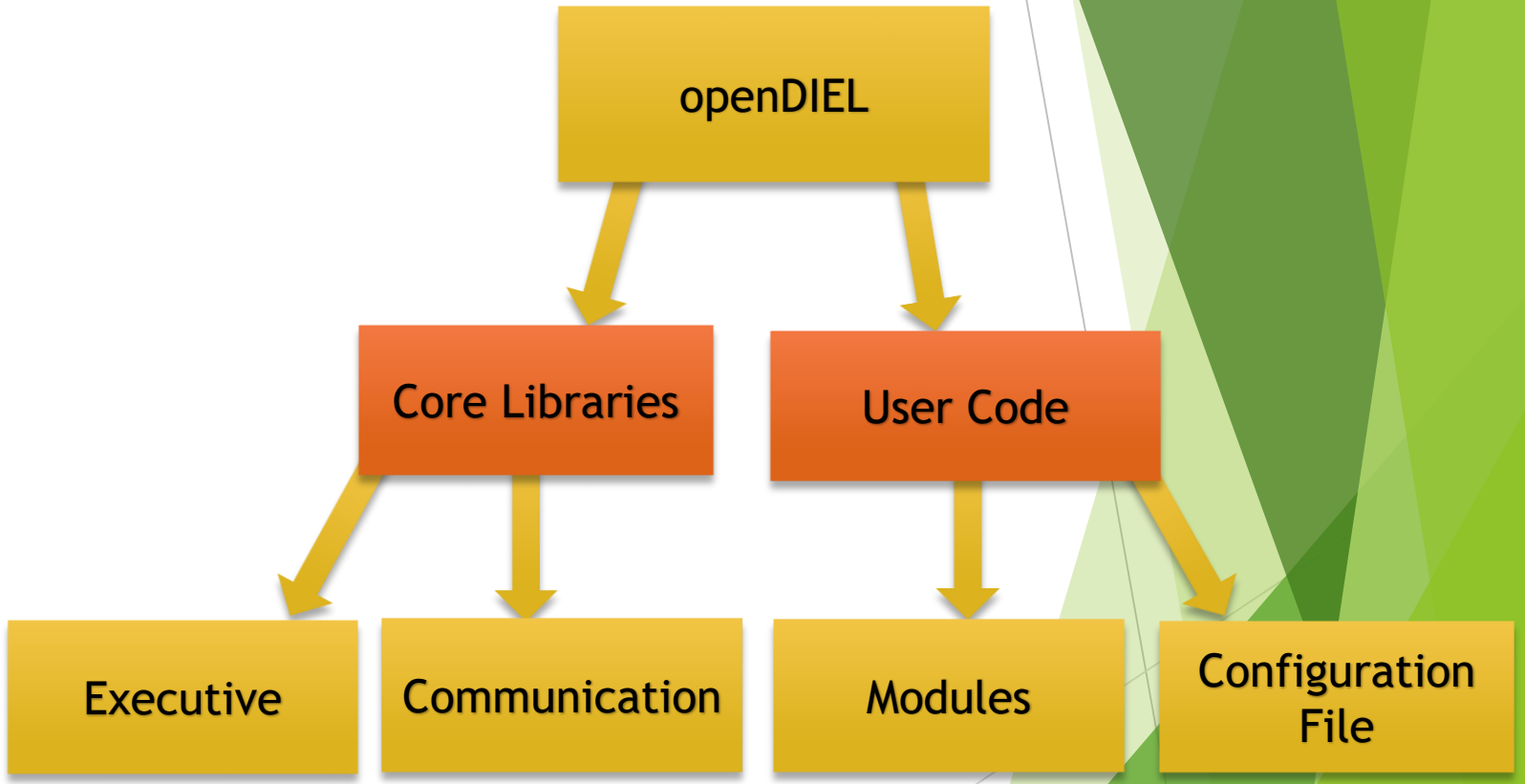
(Distributive Interoperable Executive Library) Workflow and Communications Infrastructure

By Tanner Curren and Nicholas Moran

Mentor: Kwai Wong

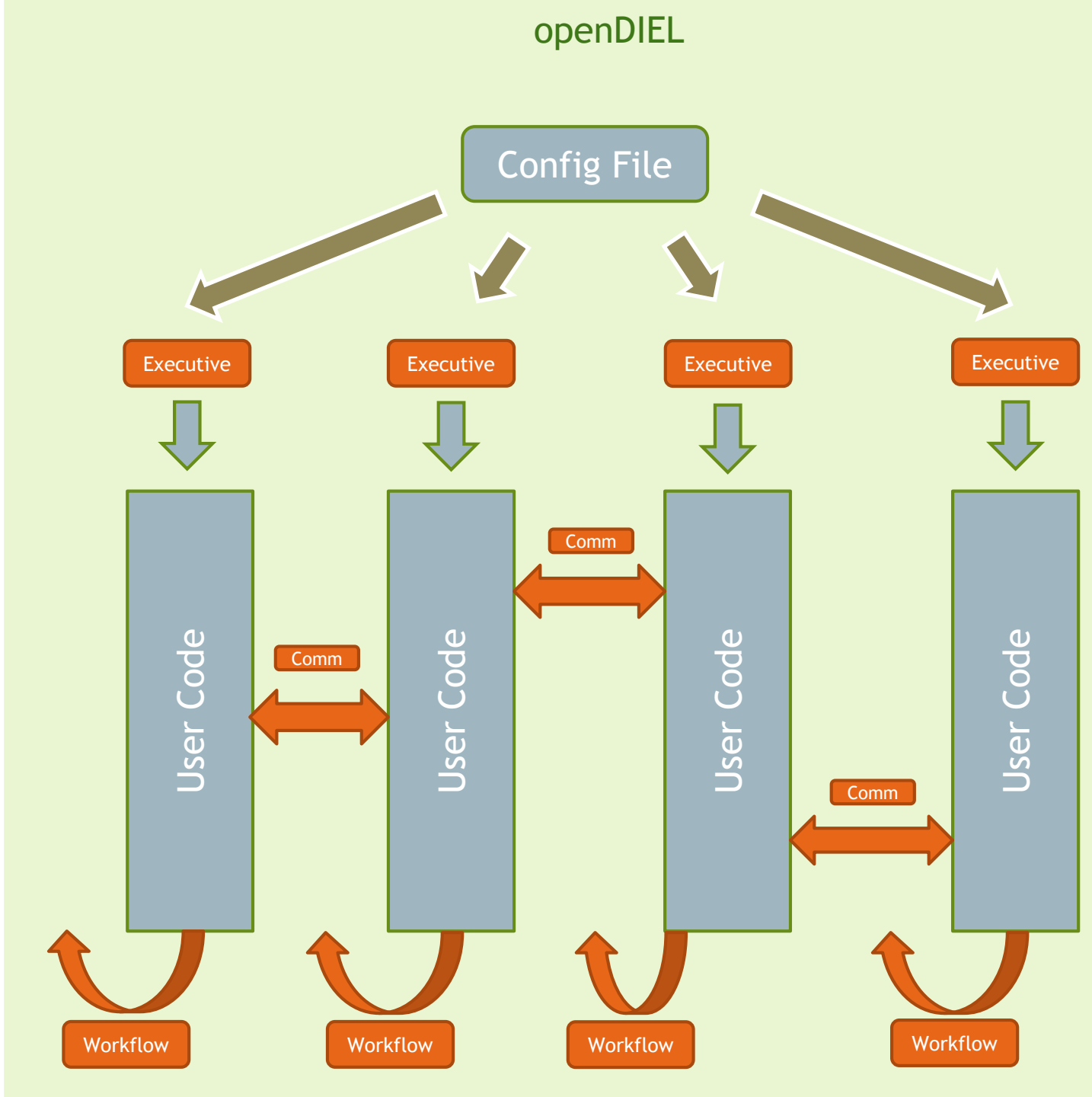
What is openDIEL?

- Loosely Coupled Simulation
  - Independently working modules
  - Modules solve a part of the problem
  - Implementations can be easily swapped
- Modules
  - Easily convert code to module
  - Generic, reusable solutions to specific problems



openDIEL in action

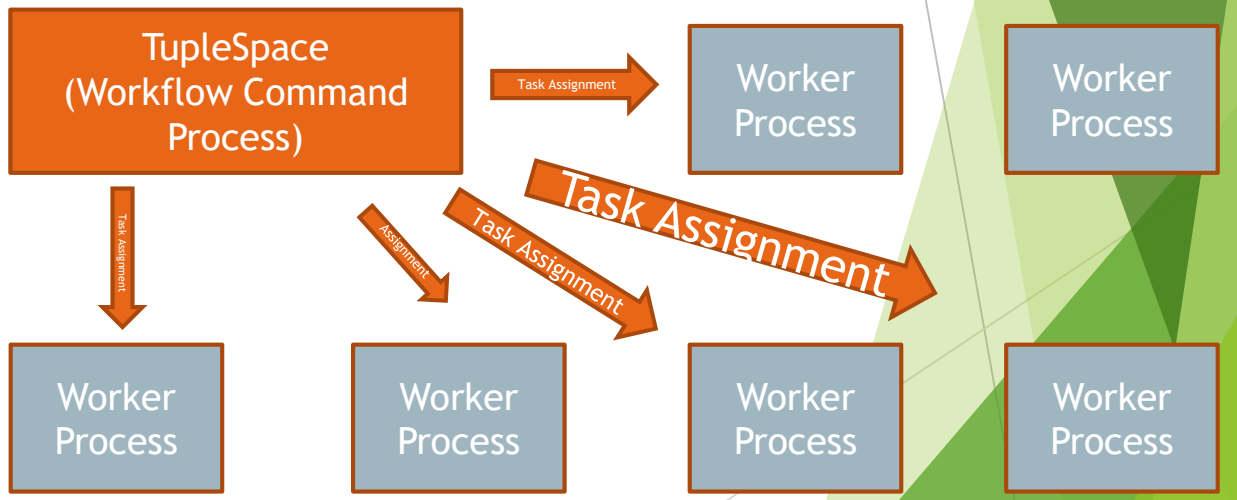
- User specified configuration
- Executive schedules modules
- Comm allows communication between modules



Current Work
Workflow Management

- How to schedule module execution
  - Workflow specified entirely by the user
  - Modules executed in a rigid fashion
- Future work
  - Central process maintains DAG
  - Dynamically assigns tasks (modules) to various processors

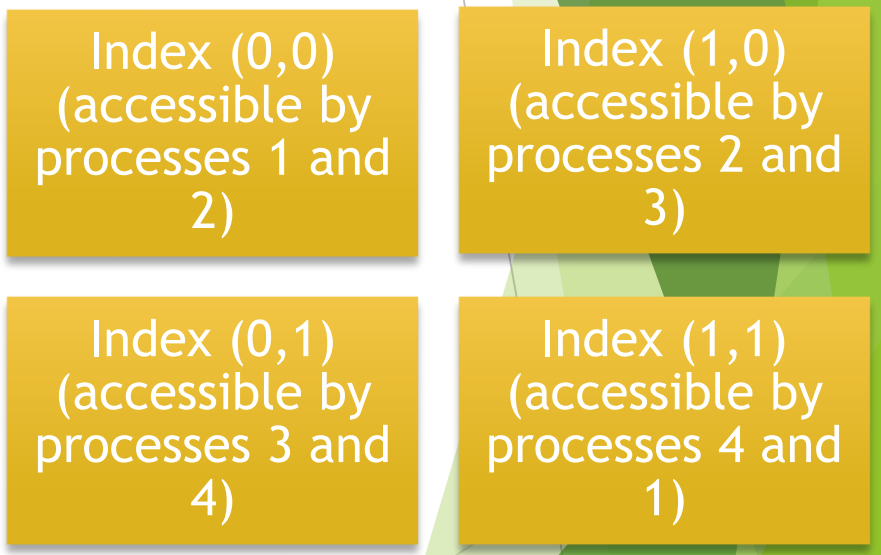
```
workflow:
{

    groups:
    {
        ep7-readvars:
        {
          order=("modep7dispatch", "modreadvarsdispatch")
          size=5
          persist=true
        }
        RAnalysis:
        {
          order=("RAnalysis")
          size=1
        }

    }

}
```



Current Work
Direct Communication

- Similar to MPI
  - Point-to-point and all-to-all
- Put and Get work with boundary conditions
  - Shared data points
  - Each process has specified area of the set of boundary conditions
  - Put and Get update these on other processes
- Currently uses a queue-based communication form called a Tuple Server
- Needs to be able to send large, contiguous chunks of data

- Boundary condition example



openDIEL Structure Diagram

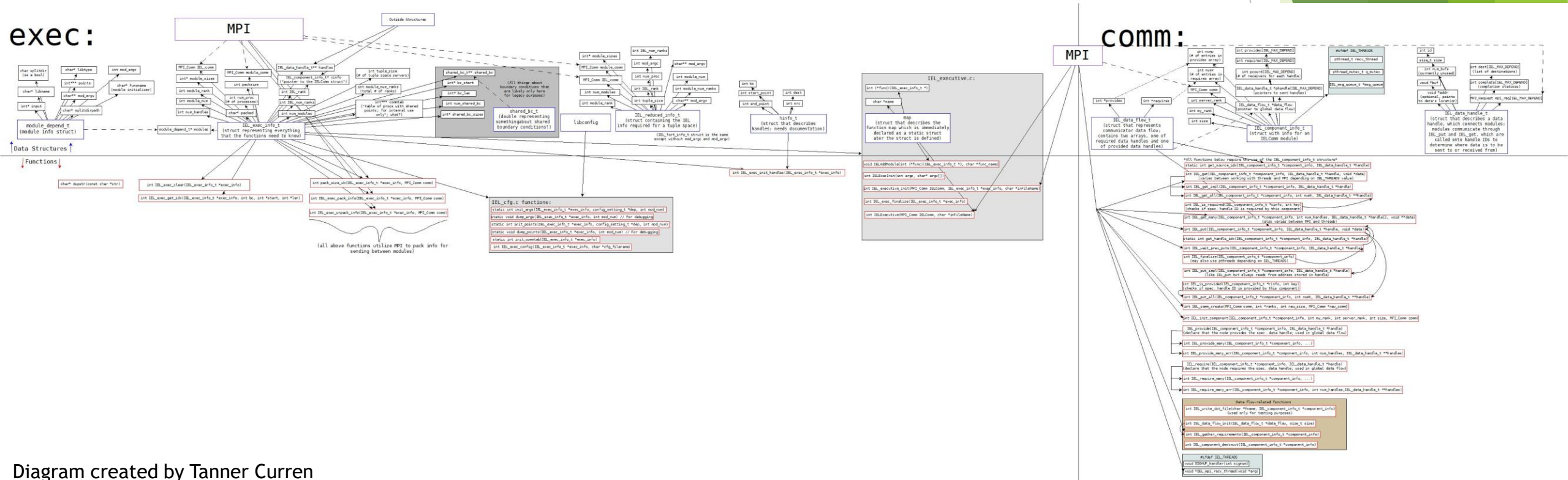


Diagram created by Tanner Curren