HPX in LibGeoDecomp

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Overview
What’s LibGeoDecomp?

- C++ Framework for Stencil Codes
- Auto-parallelizing framework
- Open Source
- High scalability
- Wide range of platform support
The Simulation Cell

```cpp
struct Cell {
    struct API;
    /* Stencil, Neighborhood, Topology, Speed, ... */

    template<typename HOOD>
    void update(HOOD const & hood, unsigned nanoStep) {
        /*
        Compute new state based on the old neighborhood
        */
    }
};
```
Implementation Details
Parallelization and scalability Considerations

Basic Simulation flow:

```java
for (Region r: innerRegion) {
    update(r, oldGrid, newGrid, step);
}
swap(oldGrid, newGrid);
++step;
for (Region r: outerGhostZoneRegion) {
    notifyPatchProviders(r, oldGrid);
}
for (Region r: outerGhostZoneRegion) {
    update(r, oldGrid, newGrid, step);
}
for (Region r: innerGhostZoneRegion) {
    notifyPatchAccepters(r, oldGrid);
}
```
Parallelization and scalability Considerations

Futurized Simulation flow:

```c
parallel for (Region r: innerRegion) {
    update(r, oldGrid, newGrid, step);
}
```

Continuation

```c
swap(oldGrid, newGrid); ++step;
parallel for (Region r: outerGhostZoneRegion) {
    notifyPatchProviders(r, oldGrid);
}
```

Continuation

```c
parallel for (Region r: outerGhostZoneRegion) {
    update(r, oldGrid, newGrid, step);
}
```

Continuation

```c
parallel for (Region r: innerGhostZoneRegion) {
    notifyPatchAccepters(r, oldGrid);
}
```