Microsoft

OpenMP 3.0 Feature: Error Detection Capability

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Why?

- OpenMP as it stands today is great for HPC
- OpenMP as it stands today is less appropriate for server side or enterprise applications
- There is simply no mechanism for error recovery – or even detection

Ideas

- We say “ideas” and not “proposals”
  - Not even half-baked
- Exception based
- Call-back function based
- Error-code based

The Problem

```
#pragma omp parallel
// Code here

#pragma omp barrier
// Code here

#pragma omp critical
// Code here
```

Idea 1: An Exception Based Approach

- Define an OpenMP Exception Class:

```
class OMPException {…};
```

- Use try/catch around select constructs

```
int foo() {
    try {
   #pragma omp parallel
    // Code here
    }
    catch (OMPException *e) {
    // Code here
    }
```

Idea 1: Exception Based Approach

- Pros
  - Seems easy to implement
  - Extensible
    - The exception can have info about what happened
- Cons
  - Only C++, not supported in C
  - Can have large perf degredation

Idea 2: Error Code Based Approach

- Add a new clause to directives
- This one sets an error code in a passed address of type OMPError when error occurs

```
OMPError *ompErr = new OMPError;
#pragma omp parallel for error(ompErr)
```

Idea 2: Error Code Based Approach

- Pros
  - Also seems easy to implement
  - Supports all languages
  - Very general
- Cons
  - Maybe violates the “even works as expected compiled serially”
  - Code to handle error is added directly to computational portion of code

Idea 3: Callback-Based Approach

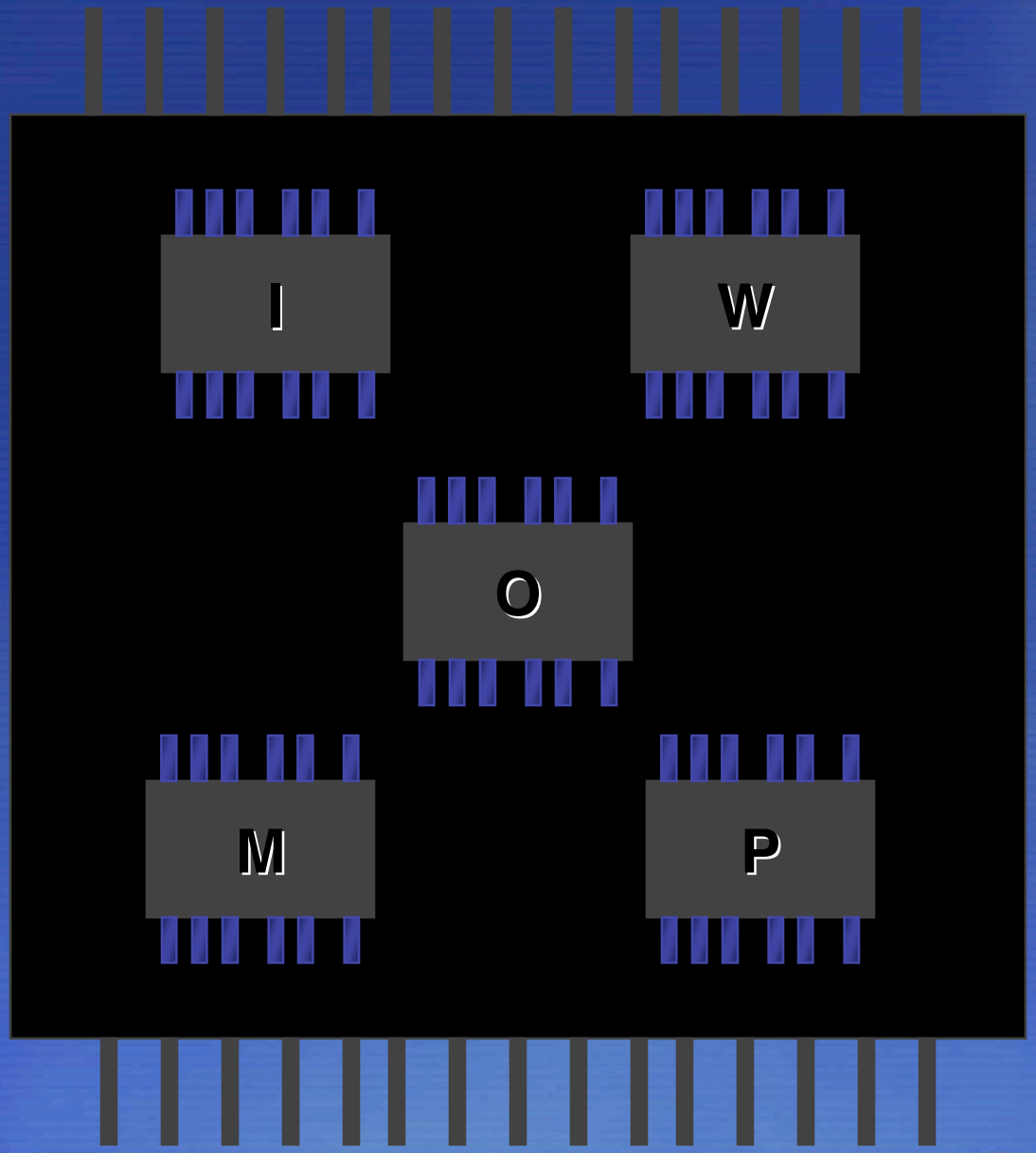
- Add a new clause to directives:

```
#pragma omp parallel error_callback(error, flag)


void error(int *flag) {
   // User code here
}
```

Idea 3: Callback-Based Approach

- Pros
  - Little performance impact if no error
  - Code is kept away from site of the computation
- Cons
  - Less extensible
  - Not really clear if it really does anything useful, but I like callbacks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