

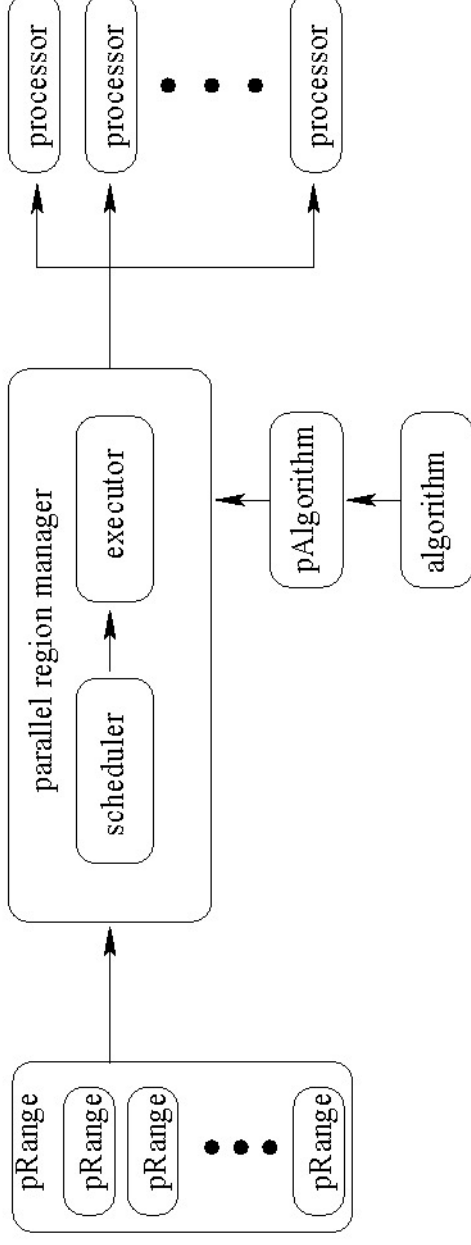
# **STAPL**

**Standard Template Adaptive  
Parallel Library**

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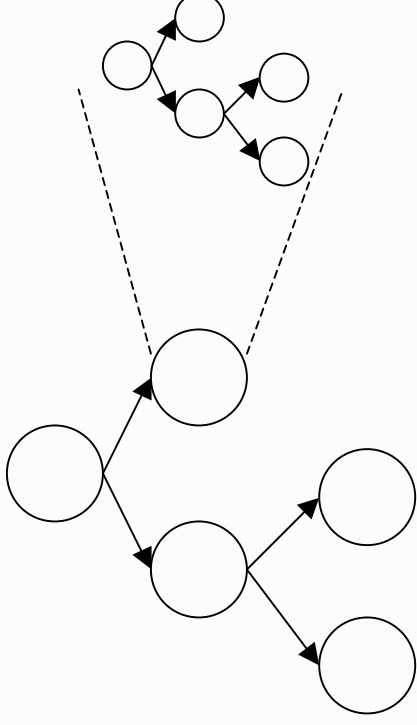
# STAPL Overview

- Superset of ANSI C++ STL
- Supports SPMD parallelism
- Shared and Distributed Memory Model Support
- Portable Means of Automatic Parallelism



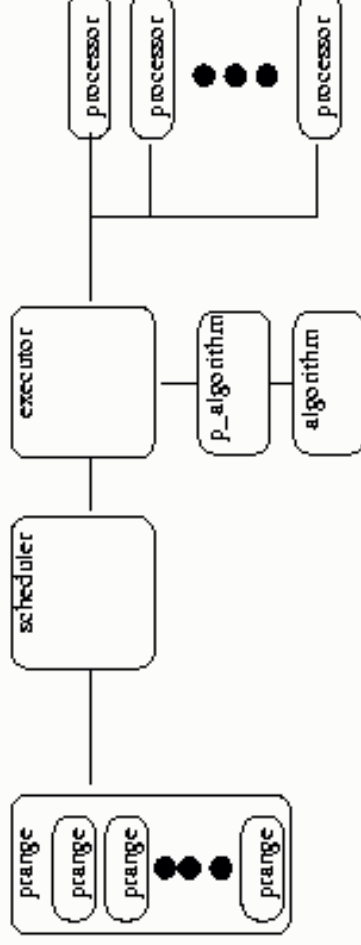
# pRange

- pRange is an abstract view of a scoped data space that partitions it into disjoint data spaces.
- Essentially, provides a set of working iterators to each thread of a pAlgorithm.
- Structure is a DAG of DAGS



# Scheduler & Executor

- Scheduler
  - Accepts pRange
  - Partitions pRange if necessary
  - Generates execution order of pRange subspaces
- Executor
  - Accepts pRange, schedule, and work function
  - Distributes pRange subspaces and work function to processors.



# Automatic Conversion

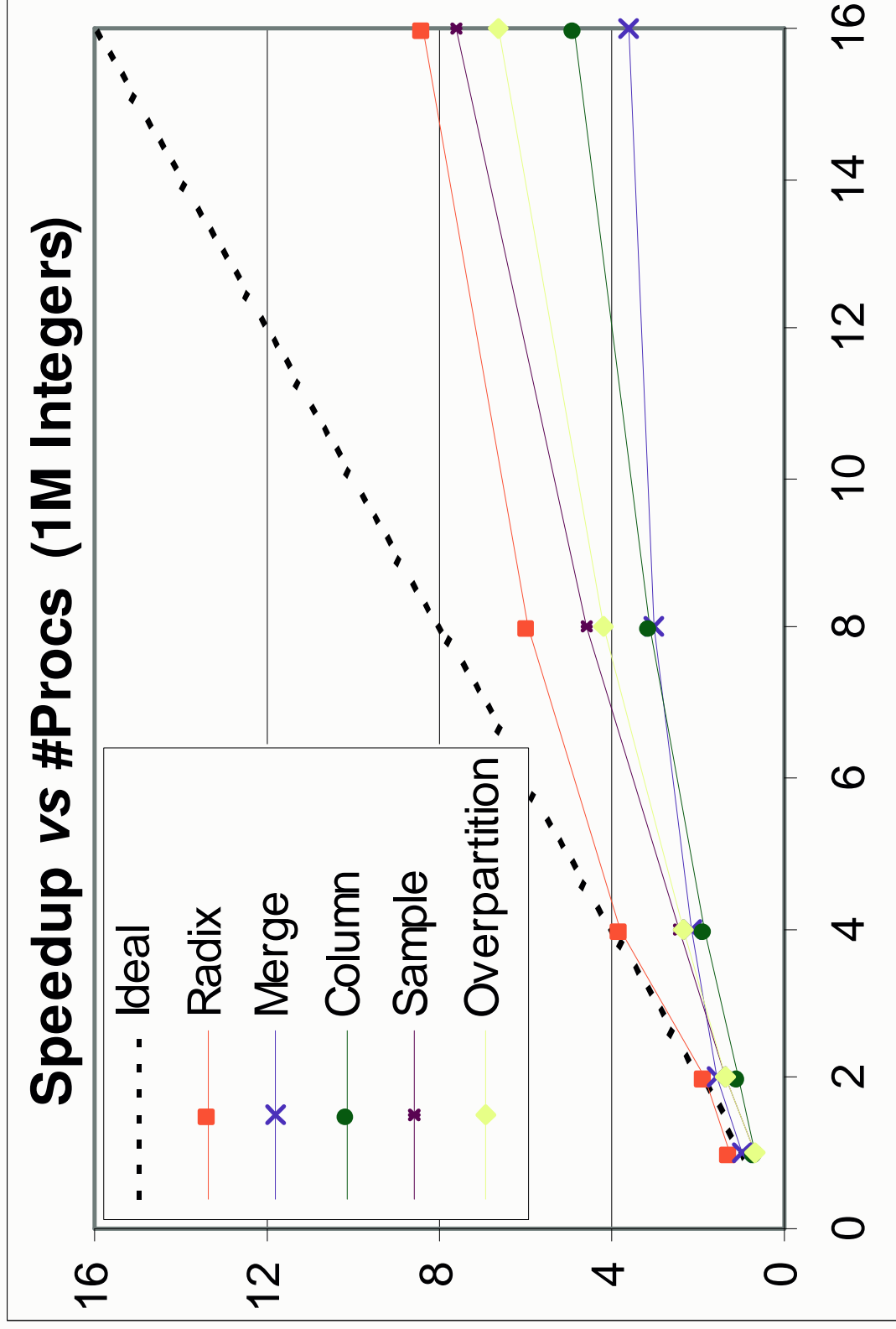
- C++ preprocessor converts STL *algorithms* into STAPL *pi\_algorithms*
- Iterators used to construct pRanges
- User must ensure custom objects are safe

```
#define START_STAPL
sort(x.begin(), x.end());
for_each(x.begin(),
         x.end(), foo());
#define STOP_STAPL
```



```
pi_sort(x.begin(), x.end());
pi_for_each(x.begin(),
            x.end(), foo());
```

# STAPL Sorting Performance



# STAPL Summary

- Standard Template *Adaptive Parallel* Library
- Automatic parallelization for a variety of programming paradigms and architectures
- User defined pAlgorithms, pRanges, and Schedulers for improved performance