# RESULTS OF THE PERI SURVEY OF SciDAC APPLICATIONS

The SciDAC Performance Engineering Research Institute has three main thrusts:
• application modeling and performance prediction;
• automated performance tuning; and
• direct engagement with SciDAC application projects.

The initial PERI engagement activity was a survey of the SciDAC application teams. The primary goal of the survey is to capture information that can be used to guide the other application engagement activities, ensuring that realistic SciDAC performance priorities are met. The survey consists of three main sections: project contact information, performance issues, and code characteristics and structure. The code characteristics and structure are essential for designing automated performance tuning support. In addition, they can shape the form of performance models. Finally, characteristics common across many of the applications, such as the use LAPACK, indicate opportunities to improve performance of many applications with one focused effort.
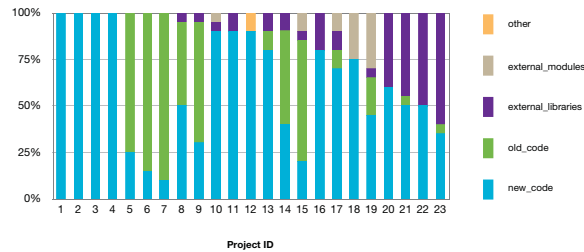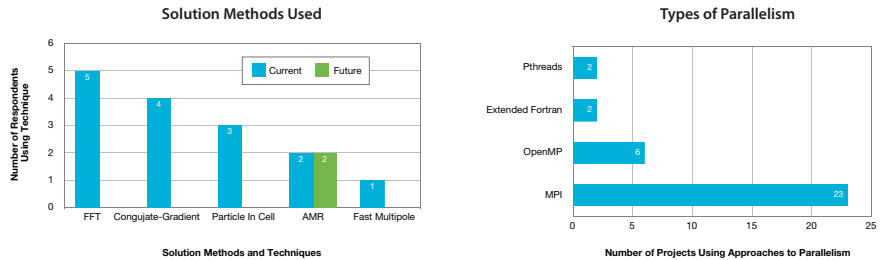
LANGUAGES

Languages Used

Number of Languages Used by Various Projects

CODE CHARACTERISTICS

Code Size (lines)

Libraries Used
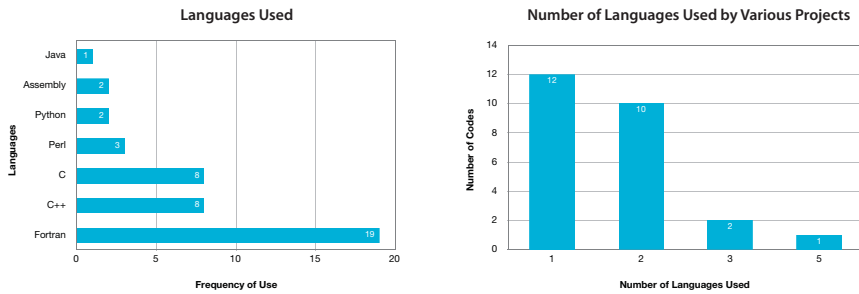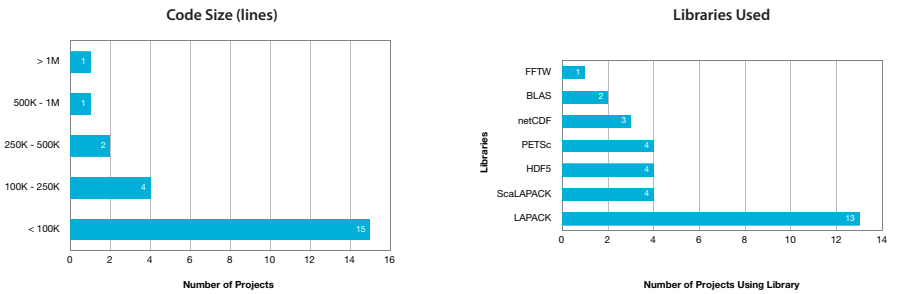
CODE DEVELOPMENT AND REUSE

TECHNIQUES USED

Solution Methods Used

Types of Parallelism

PERFORMANCE GOALS CITED

Performance Goal	Number of Applications Citing This Goal
scaling	6 (1 1000s, 3 10000s, 2 100000s of processes)
FLOPS	8 (1 20%, 1 40%, 3 50% of peak)
speedup	1 (4X)
lower overhead	1
application specific	7 (e.g., calendar years simulated/day)

PERFORMANCE BOTTLENECKS CITED

Performance bottleneck	Number of applications citing this bottleneck	Performance bottleneck	Number of applications citing this bottleneck
FFTs	3	Interprocess communication	6
linear algebra	7	Collective communication	1
AMR	1	Graph partitioning	1
memory access	3	I/O	3
Serial code	2	Code coupling	2
Load balancing	3		