DS 7347
High-Performance Computing (HPC) and Data Science
Session 17

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Research and Data Sciences Services
Office of Information Technology
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Outline

Session Question

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How is this code problematic?

```
1  #!/usr/bin/env python3
2
3  import random
4
5  def monte_carlo_pi(points):
6      s = 0
7      for i in range(points):
8          x = random.random()
9          y = random.random()
10         x2 = x**2
11         y2 = y**2
12         if x**2 + y**2 < 1
13             s += 1
14             pi = 4 * s / points
15             x = random.random()
16             y = random.random()
17     return pi
18
19 print(monte_carlo_pi(1000))
20
```

Profiling

Profilers

- Profilers are tools used to understand what a program or script is doing as a function of time.
- The information provided by a profiler can be used to understand which portions of a program or script are the most used and which may also be good targets for optimization.
- There are *many* profilers available and many of these are language or hardware specific.

Commonly Used Profilers

time	Shell program to measure time to run a command.
gprof	Statistical sampling tool that is very common on Unix systems.
cProfile	Python profiler.
Valgrind	Memory profiler.
DTrace	Dynamic tracing application.
Instruments	Profiler for Apple hardware based on DTrace.
Advisor	Profiler for Intel hardware.
VTune	Profiler for Intel hardware.
μProf	Profiler for AMD hardware.
Nsight	Profiler for NVIDIA hardware.

Examples

- time
- gprof
- cProfile and Snakeviz

Readings and Assignments

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Readings

None

Assignment

- Profile using gprof the execution of the application choosen for Lab 03.
- Commit to your class repo the output of the profiling as `assignments/assignment_05.txt`.
- Due 12:00 AM Central, Thursday, June 23, 2022