Evaluating the Pros & Cons of Sequential Programming

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Learning Objectives in this Lesson

• Recognize the pros & cons of sequential programming
Learning Objectives in this Lesson

• Recognize the pros & cons of sequential programming

Overcoming these ‘cons’ motivates our upcoming focus on concurrent & parallel programming techniques for the Java & Android platforms
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• Pros of sequential programming
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• Pros of sequential programming
  • Easy to program & debug
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- Pros of sequential programming
  - Easy to program & debug
  - “Intuitive” since it matches the steps expressed in algorithms

```c
int i, j, len = ...;
for (i = 0; i < len - 1; i++) {
    int min = i;
    for (j = i + 1; j < len; j++)
        if (a[j] < a[min])
            min = j;
    if (min != i)
        swap(a[i], a[min]);
}
```

See en.wikipedia.org/wiki/Selection_sort

This algorithm can be understood by reading it as written, i.e., there are no “surprises”

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  - The behavior in the debugger reflects actual program behavior
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• Pros of sequential programming
  • Easy to program & debug
    • “Intuitive” since it matches the steps expressed in algorithms
  • The behavior in the debugger reflects actual program behavior
  • Conversely, the behavior of non-sequential programs often differ when run in a debugger vs. “in the wild”

These differences stem from perturbations in timing from the different execution contexts
Evaluating the Pros & Cons of Sequential Programming

• Pros of sequential programming
  • Easy to program & debug
  • Deterministic execution order simplifies reasoning about & assuring program behavior

See screenprism.com/insights/article/what-is-the-ludovico-technique-and-how-does-it-work
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- Pros of sequential programming
  - Easy to program & debug
  - Deterministic execution order simplifies reasoning about & assuring program behavior
  - Especially for safety-critical cyber-physical systems

See en.wikipedia.org/wiki/Cyber-physical_system
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The right answer delivered too late becomes the wrong answer
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• Cons of sequential programming
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- Cons of sequential programming
  - Cannot leverage the parallelism available in multi-core systems

See en.wikipedia.org/wiki/Multi-core_processor
Evaluating the Pros & Cons of Sequential Programming

- Cons of sequential programming
  - Cannot leverage the parallelism available in multi-core systems
  - Performance may therefore suffer relative to concurrent & parallel programs
Evaluating the Pros & Cons of Sequential Programming

- Cons of sequential programming
  - Cannot leverage the parallelism available in multi-core systems
  - It’s hard to be responsive to multiple I/O sources/sinks
    - e.g., mouse movement/clicks, touch events, GPS location signals, network connections, asynchronous storage read & write completions, etc.

See en.wikipedia.org/wiki/Responsiveness
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See en.wikipedia.org/wiki/Event-driven_programming
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  - Cannot leverage the parallelism available in multi-core systems
  - It’s hard to be responsive to multiple I/O sources/sinks

Overcoming these ‘cons’ motivates all of the concurrency & parallelism topics that we cover henceforth!!!
End of Evaluating the Pros & Cons of Sequential Programming