Type Inference Extras

CSCI 334
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Type Inference Applications

- Compilers
  - are values used consistently with some type?
- C++ template expansion
  - must we generate a new template version?
- JVM Safety Checking
- Race condition analysis

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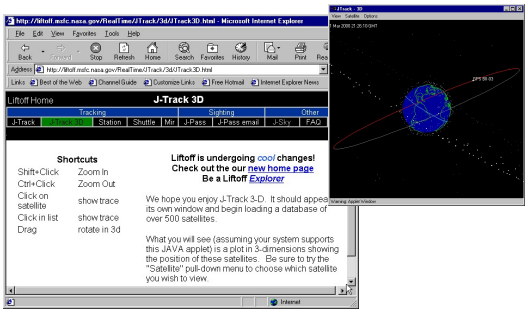
Programs on the Web



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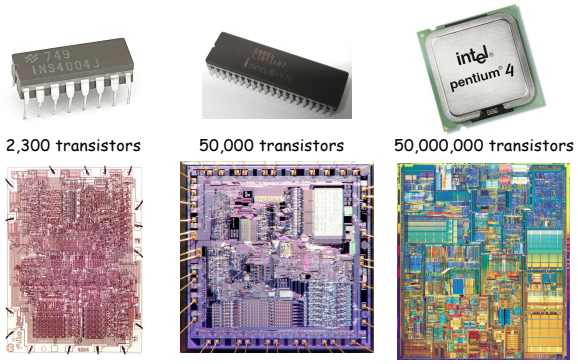
Intel 4004 (1971) | Intel 8086 (1978) | Intel Pentium 4 (2000)



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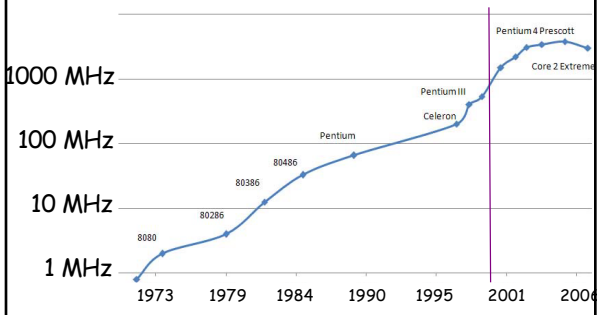
Processor Clock Speeds



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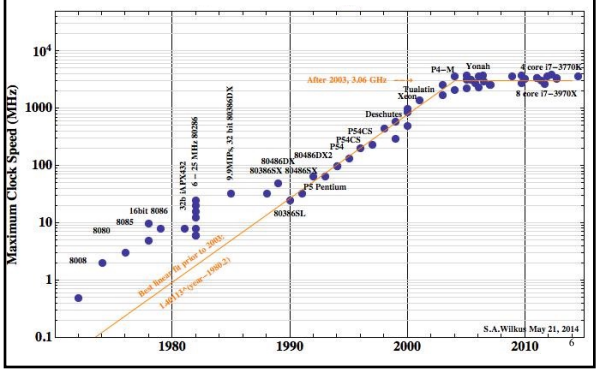

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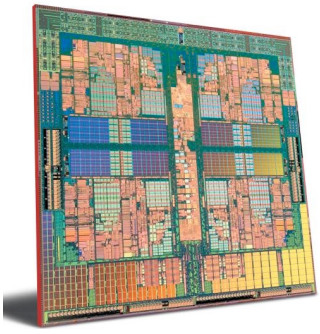
Intel Core i7 (2010)



2,000,000,000 transistors

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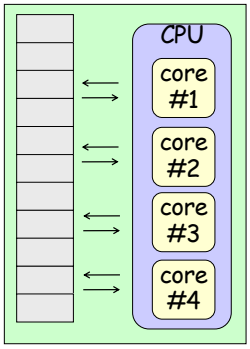
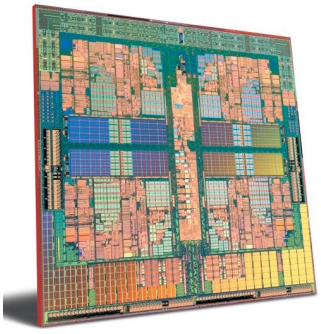
Multi-Core Chips





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Concurrent Programming With Threads

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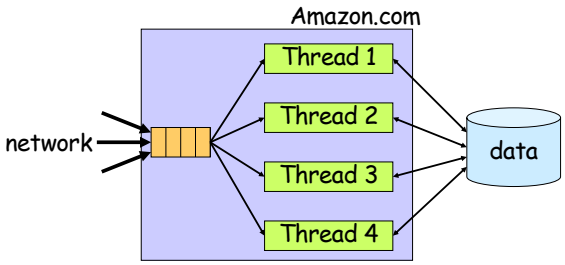
Concurrent Programming With Threads



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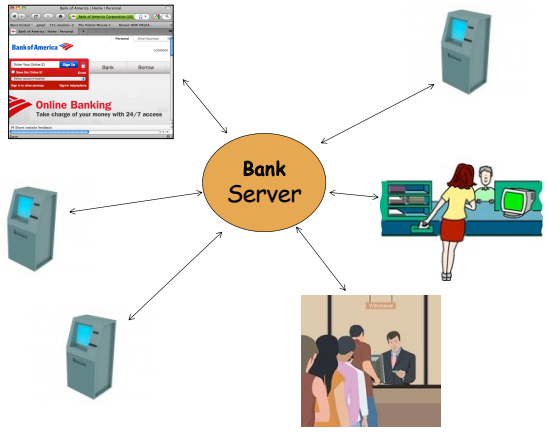

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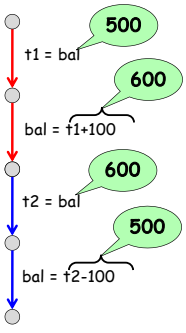
Multithreaded Program Execution

Thread A

```
...
t1 = bal;
bal = t1 + 100;
...
```

Thread B

```
...
t2 = bal;
bal = t2 - 100;
...
```



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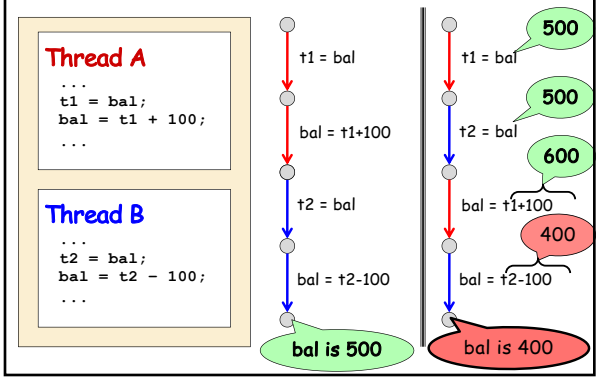
Multithreaded Program Execution



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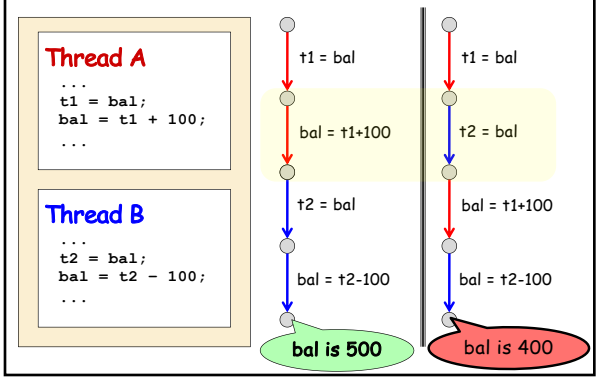
Race Condition



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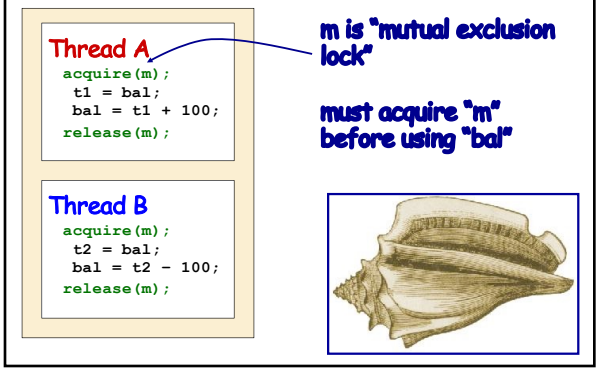
Avoiding Race Conditions



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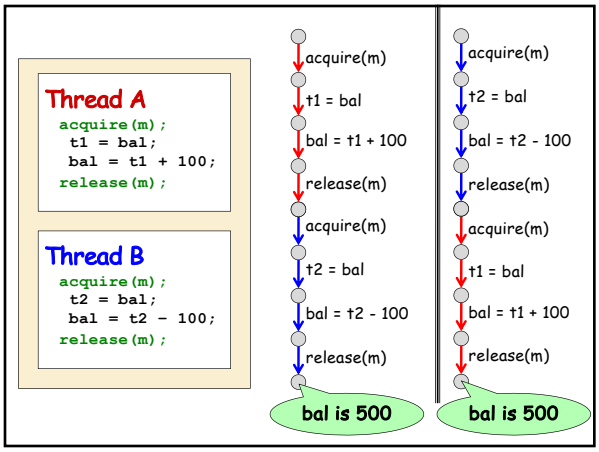

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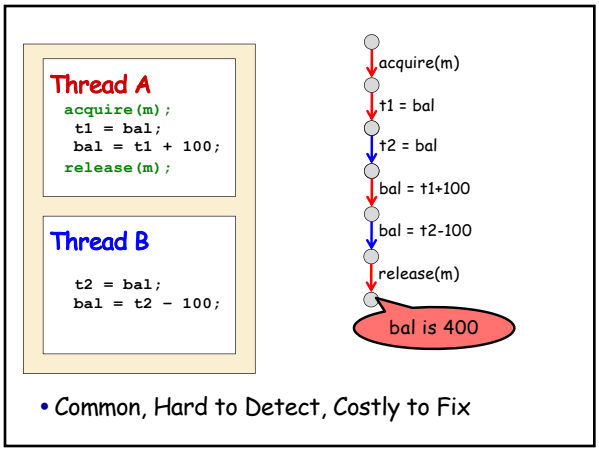

- Common, Hard to Detect, Costly to Fix

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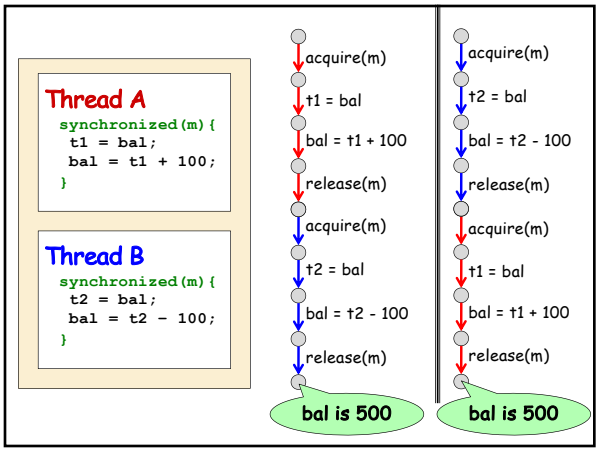

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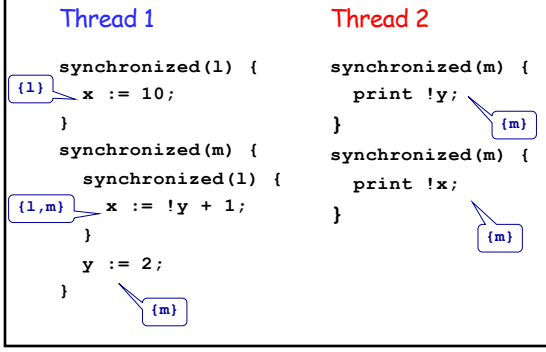
Type Inference to Identify Races



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