Understanding Risks and Provisos

Risks of concurrent, parallel, distributed, cloud computing (I)

PROGRAMMERS!

MANAGERS!
**Risks of concurrent, parallel, distributed, cloud computing (II)**

If everything shares code or resources, you do not have true redundancy!

If much of or the entire cloud is on a single power grid, what happens when storms attack? The June 29th, 2012 storm knocked out power at the Virginia data center run by Amazon Web Services. As a result, no Instagram, Netflix, or Pinterest.  
[http://tinyurl.com/9zbwdq8](http://tinyurl.com/9zbwdq8)

If there is a software glitch within the cloud, the whole cloud can be hit at roughly the same time! In April 2011, machines in the Amazon cloud (again the part in Virginia) started making backups of themselves and getting bogged down. As a result, sites like Reddit, HootSuite, and Foursquare had serious issues/downtime.  

**Risks of concurrent, parallel, distributed, cloud computing (III)**

Sharing knowledge might be all the rage, but when it comes to state it’s very dangerous!

- How do you deal with synchronizing actions? When do you lock and when don’t you?

- Imagine having a hundred people trying to withdraw the full balance of a single bank account at the same time to rob the bank.
Risks of concurrent, parallel, distributed, cloud computing (IV)

Sharing snacks might be polite, but when it comes to RAM it’s very risky!

- Could a bug in the program being run by User A accidentally trample memory being used by a program being run by User B?

- Could a program that was being run by User A decide to sneak a peak at some of the parts of memory on the same machine being used by another program being run by User B in order to steal information?

Risks of concurrent, parallel, distributed, cloud computing (V)

In trying to solve problems, we can create entirely new ones!

- Imagine you have two people working together building Ikea furniture for their new house sharing a toolbox that doesn’t have duplicate tools and they decide to work alone and if a tool is needed but not available they’ll just wait for it to become available.

- What can happen when person 1 reaches an instruction that says “Get a flathead screwdriver, an adjustable wrench, use them to ______ and then return them.” while person 2 reaches an instruction that says “Get an adjustable wrench, a flathead screwdriver, use them to ______ and then return them.”
Risks of concurrent, parallel, distributed, cloud computing (VI)

NASA might like the phrase “failure is not an option” but what happens if a machine doing part of a job fails?

- Imagine the same scenario of building Ikea furniture but with many people sharing a toolbox and one of them gets tired and leaves and forgets that they have an Allen wrench in their shirt pocket and it’s needed for others later on in the day.

- What happens if an ATM crashes or there’s a blackout after it gives you your money but before it saves your new balance? What if the crash or blackout happens after it saves your new balance but before it gives you your money?

- Can you write a program where you tell it “If you’re about to crash or lose power, clean up first!”

Risks of concurrent, parallel, distributed, cloud computing (VII)

When improvements aren’t…

- Having an upgrade to bigger caches or main memory might seem like a good thing, but how could they lead to problems with programs that used to “work just fine” for months or years?

- When your computer doesn’t have a lot of RAM, where is that “virtual memory” stuff really held? How can thinking about the relative speeds of RAM and HDD access help give an example answer to the above question?
Quad-core doesn’t mean 4x speedup…

- Overhead of starting and managing threads
- Synchronization points might be needed
- Contention for resources (like the hard drive or network)