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TCSS 462/562: (Software Engineering for) Cloud Computing
Fall 2025

School of Engineering and Technology
University of Washington – Tacoma

Class Activity 1 – Implicit vs. Explicit Parallelism

Tuesday October 7th, 2025

We've discussed four types of parallelism:

- ☐ Thread Level Parallelism (TLP)
- ☐ Data-level Parallelism
- ☐ Bit-level parallelism
- ☐ Instruction level parallelism.

1. Which two types of parallelism are *implicit*, in that they improve performance of programs without any special efforts on the part of the programmers? What makes these methods available automatically without special developer effort?

2. Which two types of parallelism are *explicit*, in that they require manual programmer effort to reap any performance benefits?

3. List advantages of *implicit* approaches to parallelism?

4. List disadvantages of *implicit* approaches to parallelism?

5. List advantages of *explicit* approaches to parallelism:

6. List disadvantages of *explicit* approaches to parallelism:

7. For *bit-level* parallelism, should a developer be concerned with the available number of virtual CPU processing cores when choosing a cloud-based virtual machine if wanting to obtain the best possible speed-up? (Yes / No)
8. For *instruction-level* parallelism, should a developer be concerned with the physical CPU's design/architecture used to host a cloud-based virtual machine if wanting to obtain the best possible speed-up? (Yes / No)
9. An application developer measures the average and peak *thread level parallelism* (TLP) of an application prior to deployment on the AWS EC2. The developer measures an average TLP of 2.3, and a peak TLP of 7.3. The application is to be deployed using a compute-optimized (c-series) ec2 instance. Using resources online, such as the websites below, propose a good virtual machine (ec2 type) that satisfies average TLP, and a second for satisfying peak TLP that does not under-provision or over-provision vCPUs for the TLP goal, in order to control costs.
<https://docs.aws.amazon.com/ec2/latest/instancetypes/co.html>
<https://instances.vantage.sh/>

Good ec2 c-series instance for average TLP: _____

why is this instance good/sufficient for average TLP?

Good ec2 c-series instance for peak TLP: _____

why is this instance good/sufficient for peak TLP?