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**What Is Polymorphic Computing?**

Polymorphic Computing is the emerging field of dynamically arranging the underlying hardware architecture around the software, even at runtime.

**What Are the Contributions of this Research?**

- A new computer architecture that can be changed ("morphed") instead of the software being changed, even during runtime!
- A new method for performing fine-grained parallelism
- A new dataflow instruction set that allows:
  - Fine-grained parallelism in an algorithm to be exploited
  - Instructions can be moved at runtime making a computer architecture that can be changed
- Provides instruction independence that allows instructions to be moved in a computer architecture
- A new processor architectural building block called an operation cell that:
  - Holds a single instruction
  - Holds the data associated with an instruction
  - Detectors wherever an instruction should execute
  - Initiates the execution of an instruction
  - Sends data to processor that executes instruction
- Example of a 6 instruction program placed in a 4-core fabric
  - Processors are essentially Arithmetic Logic Units (ALUs) that can execute in parallel
  - An instruction must be assigned to the same operation cell in each core
  - The collection of operation cells across all processors that service one instruction is called a "slice"
  - Exactly one operation cell in a slice is assigned to execute the instruction
  - Instructions in different processors may execute simultaneously if their data is available
  - All other operation cells in a slice forward any data they receive to the executable operation cell

**Potential Revolutionary Advancements**

- Allows instructions to be individually migrated between processors unlocking a new path to fine-grained instruction execution parallelism.
- Moving instructions between processors is the equivalent of changing the hardware architecture.
- Instructions can be moved at runtime making a computer architecture that can be dynamically changed!