FIT3143 Applied Presentation

Week 3: Flynn’s Taxonomy and Parallel Processing

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Tutorial 03

2025-08-09

Outline

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SISD (Single Instruction Single Data)

Definition 1 (SISD)

A single processor executes a single instruction stream to operate on data stored in a single memory. This is the traditional **von Neumann architecture**.

Diagram

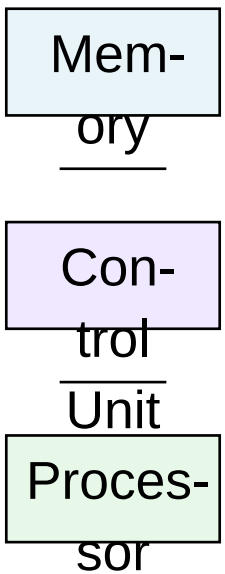

Figure 1: Basic SISD (Single Instruction, Single Data) architecture showing von Neumann model with single processor, control unit, and shared memory.

SIMD (Single Instruction Multiple Data)

Definition 1 (SIMD)

A single instruction stream operates on multiple data streams simultaneously. Common in vector processors and GPU architectures.

Diagram

SIMD Architecture Diagram

Figure 2: SIMD (Single Instruction, Multiple Data) architecture showing shared control unit with multiple processing elements operating on different data sets.

MISD (Multiple Instruction Single Data)

Definition 1 (MISD)

Multiple instruction streams operate on a single data stream. This architecture is rare but used in fault-tolerant systems and parallel processing of single data through multiple stages.

Diagram

MISD Architecture Diagram

Figure 3: MISD (Multiple Instruction, Single Data) architecture showing multiple processors with different control units operating on the same data stream.

MIMD (Multiple Instruction Multiple Data)

Definition 1 (MIMD)

Multiple instruction streams operate on multiple data streams independently. This is the most common parallel architecture used in modern multi-core processors and distributed systems.

Diagram

MIMD Architecture Diagram

Figure 4: MIMD (Multiple Instruction, Multiple Data) architecture showing independent processors with local control units and memories connected through a shared interconnection network.

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Code Snippet: C - Shared Memory Communication

C

```c
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
void *print_message_function( void *ptr )
{
char *message;
message = (char *) ptr;
printf("%s \n", message);
}
int main()
{
```

```
12  pthread_t thread1, thread2;
13  char *message1 = "Thread 1";
14  char *message2 = "Thread 2";
15  int iret1, iret2;
16  iret1 = pthread_create( &thread1, NULL, print_message_function,
17  (void*) message1);
18  iret2 = pthread_create( &thread2, NULL, print_message_function,
19  (void*) message2);
20  printf("Thread 1 returns: %d\n",iret1);
21  printf("Thread 2 returns: %d\n",iret2);
22  return;
23  }
```

What are the Possible Outcomes?

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Reason for the Possible Outcomes

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