Module 2: Concurrency Basics
Topic 2.1: Interleavings

Interleavings

- Order of execution within a task is known
- Order of execution **between** concurrent tasks is unknown
- Interleaving of instrstuctions between tasks is unknown

Task 1

1: `a = b + c`

2: `d = e + f`

3: `g = h + i`

Task 2

1: `r = s + t`

2: `u = v + w`

3: `x = y + z`

Possible Interleavings

1: a = b + c	
	1: r = s + t
2: d = e + f	
	2: u = v + w
3: g = h + i	
	3: x = y + z

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- Many interleavings are possible
- Ordering is **non-determininstic**
- Must consider all possibilities

Race Conditions

- Outcome depends on non-deterministic ordering

1: `x = 1`	
	1: `print x`
2: `x = x + 1`	

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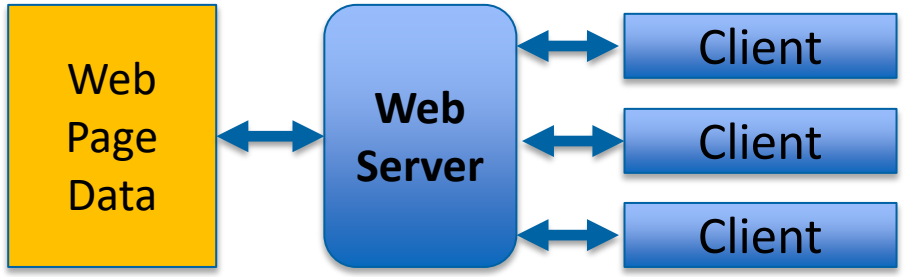
Communication Between Tasks

- Threads are largely independent but not completely independent
- Web server, one thread per client



- Image processing, 1 thread per pixel block