



# Computer architecture

Amdahl's law

# Tasks:

```
.global _start  
_start:
```

```
mov r0,#0  
mov r5,#0
```

```
loop1:  
add r0,r0,#1  
add r5,r5,#1  
cmp r0,#1024  
blt loop1  
mov r0,#0
```

```
loop2:  
add r0,r0,#1  
add r5,r5,#1  
cmp r0,#2048
```

```
blt loop2  
mov r0,#0
```

```
loop3:  
add r0,r0,#1  
add r5,r5,#1  
cmp r0,#4096  
blt loop3  
mov r0,#0
```

```
loop4:  
add r0,r0,#1  
add r5,r5,#1  
cmp r0,#1024  
blt loop4  
mov r0,#0
```

# Amdahl Law

$$S_{max} = \frac{1}{(1-p) + \frac{p}{s}}$$

**Amdahl's law formula** calculates the expected speedup of the system if one part is improved. It has three parts:  $S_{max}$ ,  $p$ , and  $s$ .

$S_{max}$  is the maximum possible improvement of the overall system. It is expressed as a decimal greater than 1. If the operation is improved to be done in half the time,  $S_{max} = 2$ . Higher means a greater improvement.

$p$  is the part of the system to be improved, expressed as a number between 0-1. If the part is 45% of the system,  $p = 0.45$ .

$s$  is the improvement factor of  $p$ , expressed by how many times faster  $p$  can be done. If it can be done in 1/3rd the time, then  $s = 3$ .

Essentially, the equation subtracts out the part to be improved, then puts it back in after it has been improved.

An abstract graphic on the left side of the slide, composed of thick, curved lines. The lines are primarily pink and magenta, with a section at the bottom left transitioning into a bright orange color. The lines curve and loop, creating a dynamic, organic shape.

**Thank you for  
your attention!**