

Exercise session  
(Memory management)

Operating Systems – EDA093/DIT401

Vincenzo Gulisano  
[vincenzo.gulisano@chalmers.se](mailto:vincenzo.gulisano@chalmers.se)



UNIVERSITY OF  
GOTHENBURG

# Exercise 1

- Suppose a process P has size of 100 bytes. Compute (1) the number of wasted bytes caused by internal fragmentation if the page and frame sizes are set to  $2^4$  bytes and (2) the size of the page table.

# Exercise 1 - solution

- Page size = 16 bytes
- Number of pages required =  $\text{ceil}(100/16) = 7$
- Wasted bytes because of internal fragmentation  $16 - 100\%16 = 12$  bytes
- Page table =  $7 * (8) = 56$  bits

## Exercise 2

Assuming a 1 KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers):

2375

19366

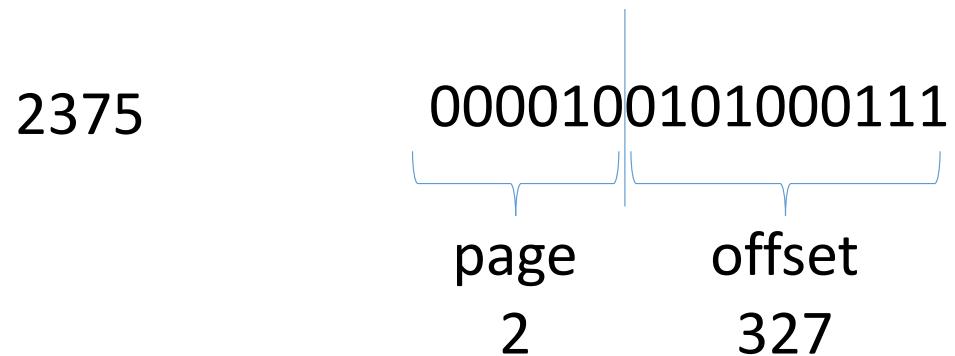
30000

256

16385

## Exercise 2 - solution

$$1 \text{ KB} = 2^{10}$$



...

# Exercise 3

Consider the following segment table:

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1352	96

Tell which physical address would be accessed for the following logical addresses

0,430

1,10

2,500

3,400

4,112

## Exercise 3 - solution

$219 + 430 = 649$

$2300 + 10 = 2310$

illegal reference, trap to operating system

$1327 + 400 = 1727$

illegal reference, trap to operating system