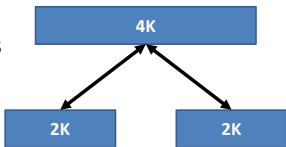# Buddy Allocation

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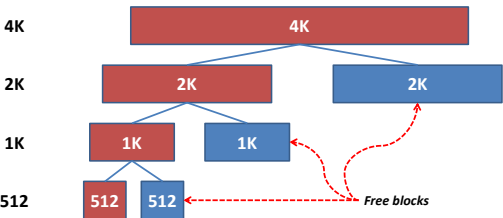
1

Buddy Allocation Scheme

- Idea is that a memory area can be split in two
  – Two buddies

- Likewise, two buddies can be combined
  – Reforming **original pair** into larger block

- Each buddy 2^n bytes

```
        4K
       /  \
     2K    2K
```

2

Splitting Free Region

4K — 4K

2K — 2K | 2K

1K — 1K | 1K

512 — 512 | 512 ← Free blocks

Allocating 512 bytes:
- Repeatedly split until we have right sized block

3

Buddy Allocation Example

	4K			
Allocate 512 bytes	512	512	1K	2K
Allocate 128 bytes	512		1K	2K
Allocate 256 bytes	512	256	1K	2K
Allocate 256 bytes	512		512	2K
Allocate 512 bytes	512		512	2K
Allocate 512 bytes	512		512 512 512	1K
Allocate 513 bytes	512		512 512 512	1K

513 rounded to 1K, 511 bytes will remain unused

4

Buddy Example: *Freeing Memory*

	A	B	C	D	E	F	512	G	
Free E	A	B	C	D	512	F	512	G	
Free F	A	B	C	D	512	1K		G	
Free D	A	B	C	1K		1K		G	
Free A	512	B	C	1K		1K		G	
Free B	512	256	C	1K		1K		G	
Free C	2K				1K			G	
Free G	4K								

Note we cannot combine blocks split from different parent blocks, and we cannot rearrange allocated blocks – something will be using them!

5

Contiguous Memory Allocation

- Buddy combined with Fixed Size Memory Allocation:
  - Buddy can easily manage and track multiple blocks
  - *n* blocks at any level always contiguous

32K	8 blocks
16K	4 blocks / 4 blocks
8K	2 blocks / 2 blocks
4K	4K / 4K

Free blocks/ pages

6

2