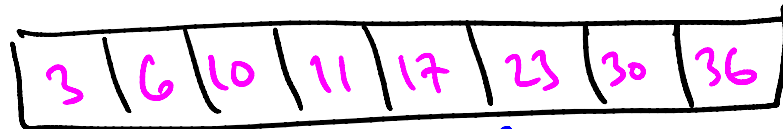Design and Analysis
of Algorithms I

Data Structures

Balanced Search Trees: Supported Operations

Sorted Arrays: Supported Operations

| 3 | 6 | 10 | 11 | 17 | 23 | 30 | 36 |

BUT WHAT ABOUT
INSERTIONS + DELETIONS ?
(would take $\theta(n)$ time)

OPERATIONS	RUNNING TIME
SEARCH	$\theta(\log(n))$
SELECT (given order statistic I)	$O(1)$
MIN/MAX	$O(1)$
PRED/SUCC (given pointer to a key)	$O(1)$
RANK (i.e., # of keys less than or equal to a given value)	$O(\log(n))$
OUTPUT IN SORTED ORDER	$O(n)$

Tim Roughgarden

Balanced Search Trees: Supported Operations

Raison d'etre : like sorted array + fast (logarithmic) inserts + deletes !

OPERATIONS		RUNNING TIME
SEARCH		$\theta(\log(n))$
SELECT		$O(\log(n))$
MIN/MAX		$O(\log(n))$
PRED/SUCC		$O(\log(n))$
RANK		$O(\log(n))$
OUTPUT IN SORTED ORDER		$O(n)$
INSERT		$O(\log(n))$
DELETE		$O(\log(n))$

Also supported by hash tables

Also supported by heaps

Up from $O(1)$

new

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