Mathematics for Computer Science

MIT 6.042J/18.062J

Parallel Scheduling

parallel processing time

min # terms to graduate:

min parallel time = max chain size

max term load:

processors for min time

$\leq$ max antichain size

5 in this case

Minimum "Parallel" Time

#processors

$\leq$ max antichain size

Minimum "Parallel" Time

#processors

$\leq$ max antichain size

we saw 3 processors

may still do min time

Minimum # terms?

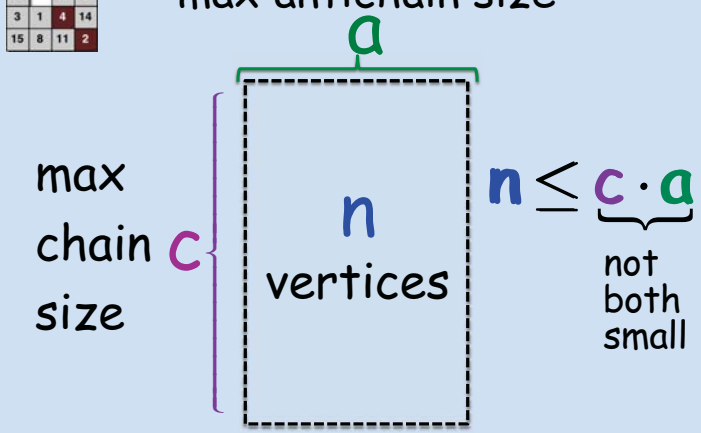
13 subjects

max chain size = 5

so load of some term must be

$$\geq \lceil 13/5 \rceil = 3$$

max antichain size



Dilworth's Lemma

every n-vertex DAG has

- a chain of size $> t$
- or antichain of size $\geq \frac{n}{t}$

for all $1 \leq t \leq n$.

Dilworth's Lemma

every n-vertex DAG has

- a chain of size $> \sqrt{n}$
- or antichain of size $\geq \sqrt{n}$

Height/Birthday DAG

Edge from one student to another iff one is shorter and younger than the other.

$(s_1, a_1) \rightarrow (s_2, a_2)$

iff $(s_1 \leq s_2)$ and $(a_1 \leq a_2)$

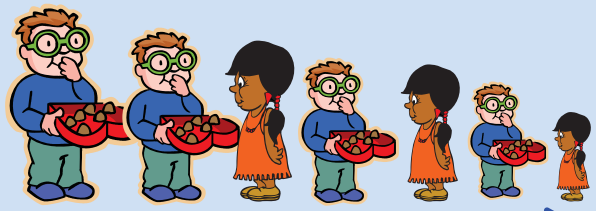
(the product graph)

Height/Birthday DAG

by Dilworth, our class of 141 has a chain or antichain of

$$\left\lceil \sqrt{141} \right\rceil = 12$$

Dilworth Lemma



older

a height/bday antichain

height/bday antichain

Banda Daltso:	9/11/91, 5'
Biswas Jyotizhka:	4/9/92, 5'1''
Felso Valkyrie:	4/20/92, 5'1''
Balewski Zuzanna:	8/5/92, 5'2''
Chang Carolyn:	9/5/92, 5'2''
Che Denise:	3/19/93, 5'3''
Bartel Kathryn:	5/24/93, 5'4''
Andersen Jessica:	8/6/93, 5'5''
Abate Shalom:	9/3/93, 5'9''
Batscha Jonathan:	11/8/93, 5'10''
Alowayed Yousef:	4/4/94, 6'
Belson Itamar:	8/30/94,6'1''

older

shorter

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