Presentation 5

Fynn Lohren, Carsten Schubert, Leon Suchy

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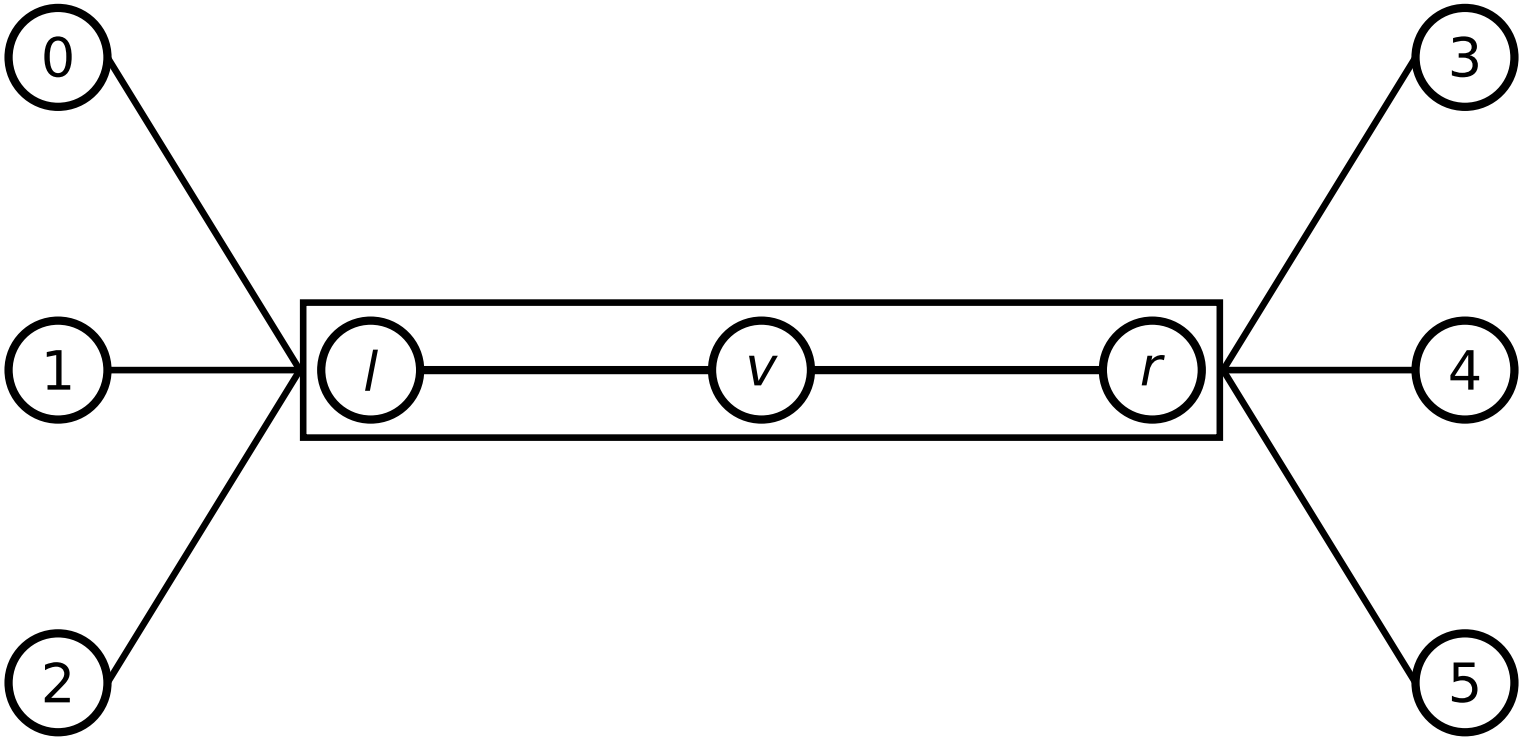
Profiling & Optimization

- Measured times with Perf
- Lots of tiny optimizations
- Most time spent with reductions

Profiling & Optimization

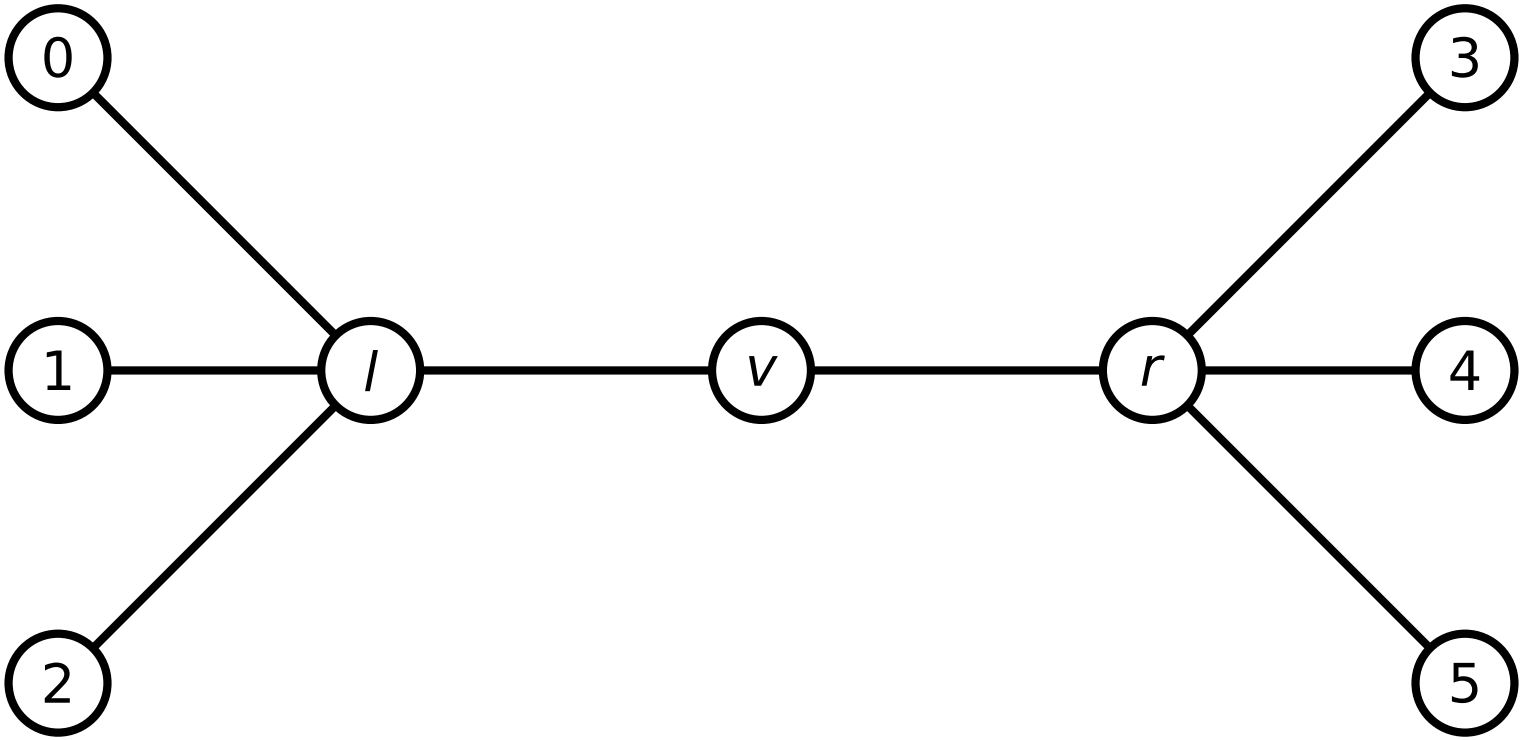
- Measured times with Perf
- Lots of tiny optimizations
- Most time spent with reductions
- Optimize 2-fold
- Build meta data late
- Apply initial reductions

Old 2-fold



Better 2-fold

Use middle vertex to represent the group



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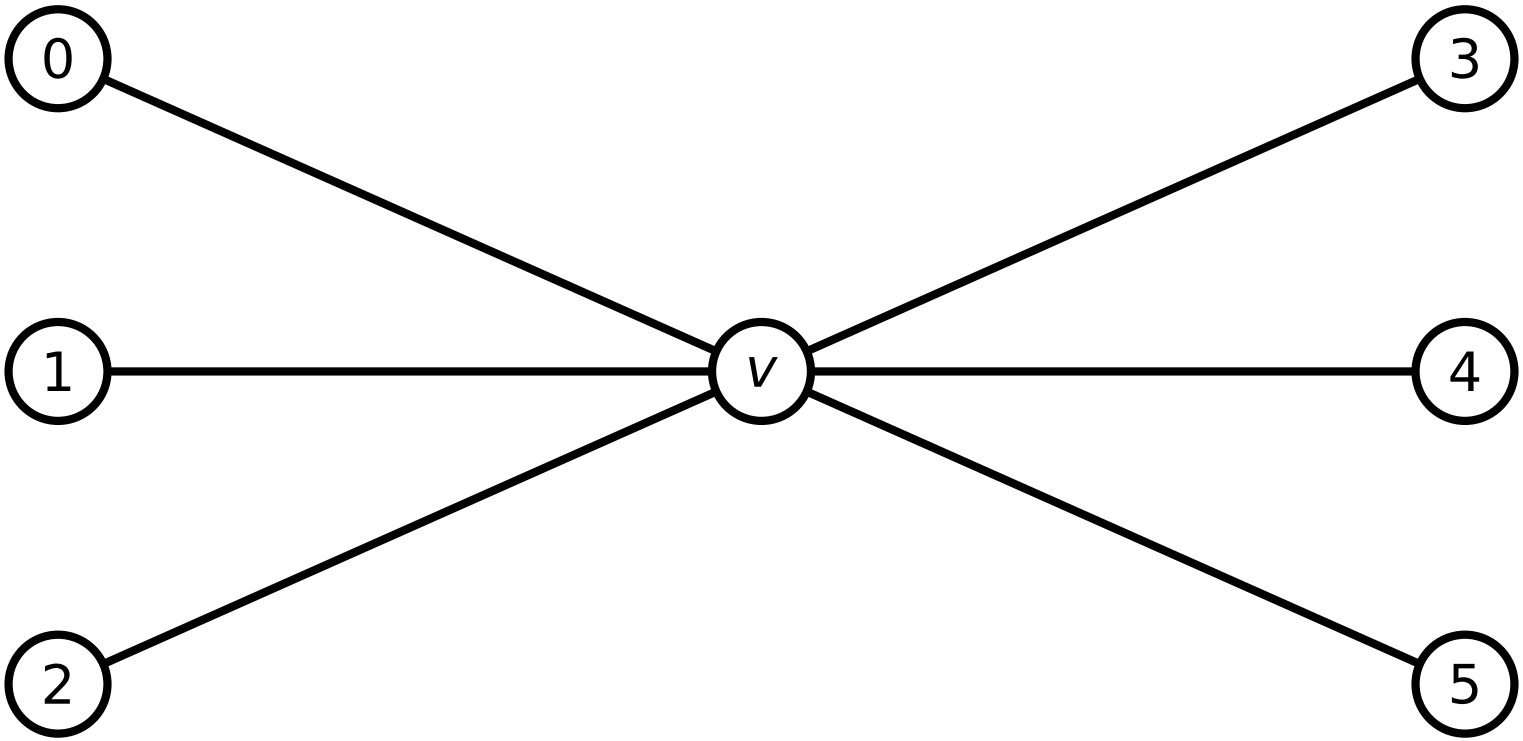

Config Parameters

- Maximum degree
- Frequency
- Lower bound toggles
- Groups

Data Reduction Groups

- Always exhaustive is inefficient
- Once: Apply reductions non-exhaustively
- Exhaustive
  $\rightarrow$ Frequency: Every k recursion layers

```
1 {
2   "name": "once", "priority": 6, "frequency": 1,
3   "data-reductions": [
4     { "name": "degree > k", "priority": 5 }
5   ]
6 }
```

Overview

- 14 Data reductions
- 3 Lower bounds
- Components
- Mirror Branching
- Kernelization

Overview - Data Reductions

- Degree 0, 1, 2, 3, 4 and >k
- 2: Fold, Triangle
- 3: Independent Set, Neighbor Clique Partition
- 4: Path, Crossbow, Trebuchet
- Dominate
- Unconfined
- Crown
- LP
- Neighbor Clique Partition

Overview - Lower Bounds

- Clique Cover
- Cycle Cover
- LP

Retrospective

Not every theoretical concept was useful in practice

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Algorithmic efficiency vs. technical efficiency

Retrospective

Not every theoretical concept was useful in practice

Algorithmic efficiency vs. technical efficiency

Organization, communication and clear goals are important