3 Database Problems in Data Visualization Management Systems

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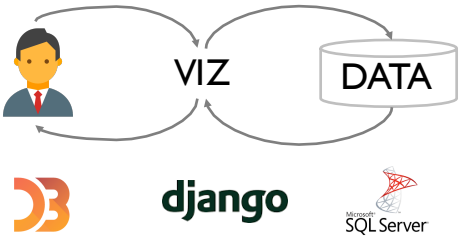
CUDBG



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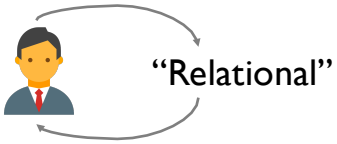

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3 Database Problems in Visualization

1. Lineage
2. Consistency
3. Query Mining

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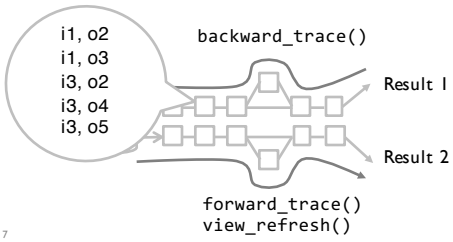
Lineage + Interactions

Lineage: high materialization cost, queries slow



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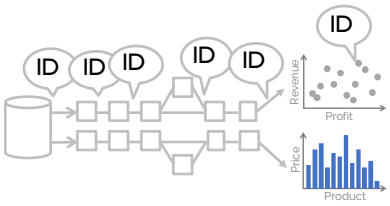
Lineage + Interactions

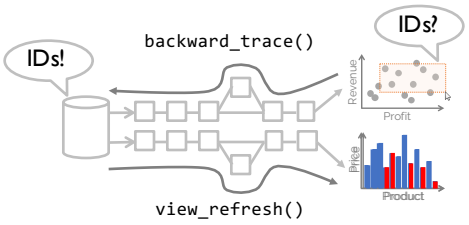
Lineage: high materialization cost, queries slow

Interactions expressed as lineage queries

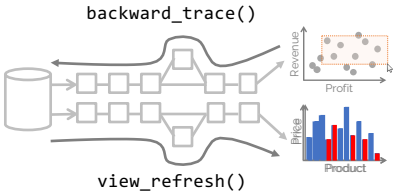


Lineage + Interactions

Lineage: high materialization cost, queries slow
Interactions expressed as lineage queries

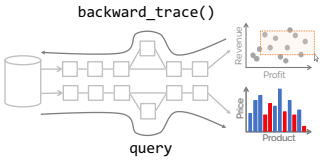


Lineage + Interactions



~~backward_trace(..)~~ ✘
People don't want raw lineage

query(backward_trace(..)) ✔
They want to *query* lineage
avoid materialization costs
lineage query optimization



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Perception Push-down

Existing Work
Eyes not perfect
→
Render approx viz

In General
Model human properties
→
Use models in viz system

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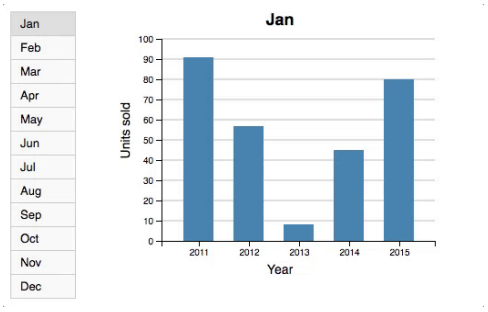

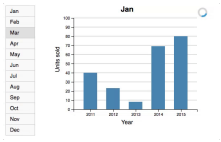

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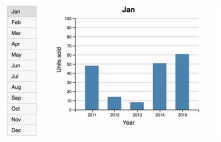

Serial Order

Does asynchrony affect users? When?

Hypotheses
1. User task matters
2. Design tricks can improve completion speed

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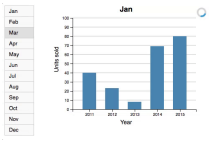

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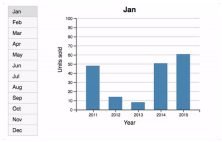

Serial Order

Multi-View Concurrency Control

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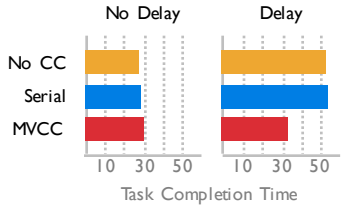
Task matters

Users self-serialize

MVCC (design) has an effect



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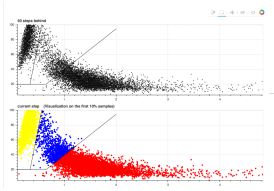
What Interfaces to Build?

2 underserved issues

Many useful UI don't exist due to high friction or org challenges

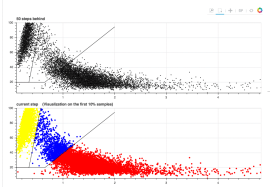
Viz systems go for coverage over task efficiency

PI Precision Interfaces



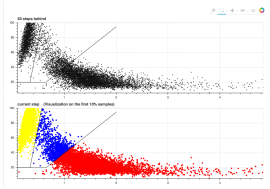
```
SELECT   *
FROM     blackholedata
WHERE    1.2 < x AND x < 1.5 AND
         40 < y AND y < 60 AND
         timestep = -50
```

http://ngoix.github.io/cyg-xl/index.html



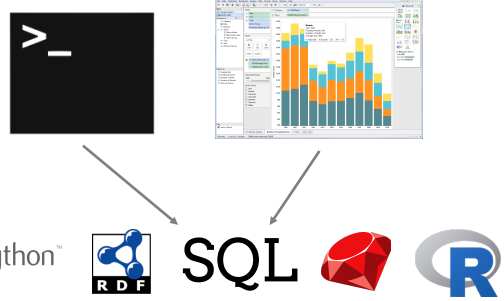
```
SELECT   *
FROM     blackholedata
WHERE    1.2 < x AND x < 1.5 AND
         40 < y AND y < 60 AND
         timestep = now
```

http://ngoix.github.io/cyg-xl/index.html



```
SELECT   *
FROM     blackholedata
WHERE    1.5 < x AND x < 1.8 AND
         45 < y AND y < 65 AND
         timestep = now
```

http://ngoix.github.io/cyg-xl/index.html



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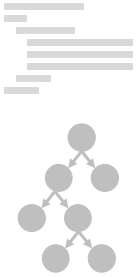

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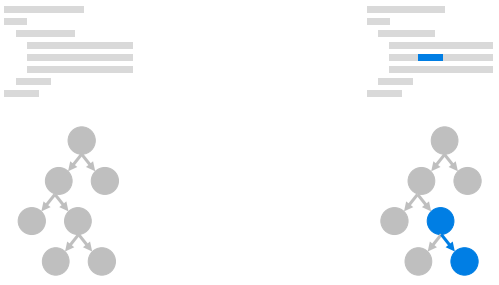

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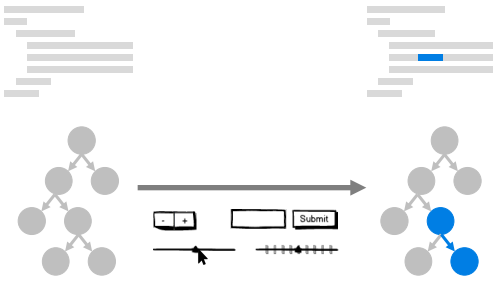

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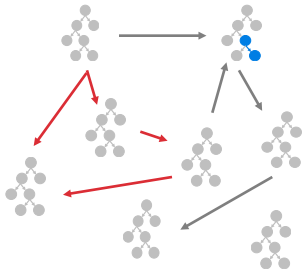

Cost ~ UIComplexity + #Nodes + #Edges

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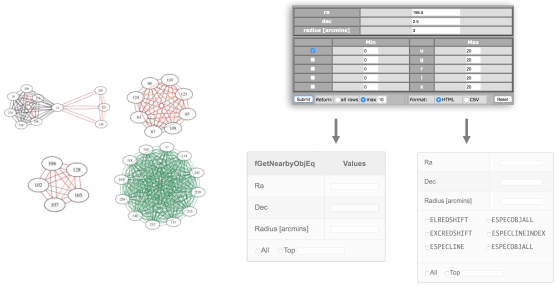
Sloan Digital Sky Survey



Simplicity Completeness

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N Database Problems in Visualization

1.Lineage
2.Consistency
3.Query Mining
4.And more…

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DVMS

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