SVL: Storage Virtualization Engine Leveraging DBMS Technology

Presentation of a paper by L. Qiao, B. Iyer, D. Agrawal and A. El Abbadi from the International Conference on Data Engineering (ICDE'05)

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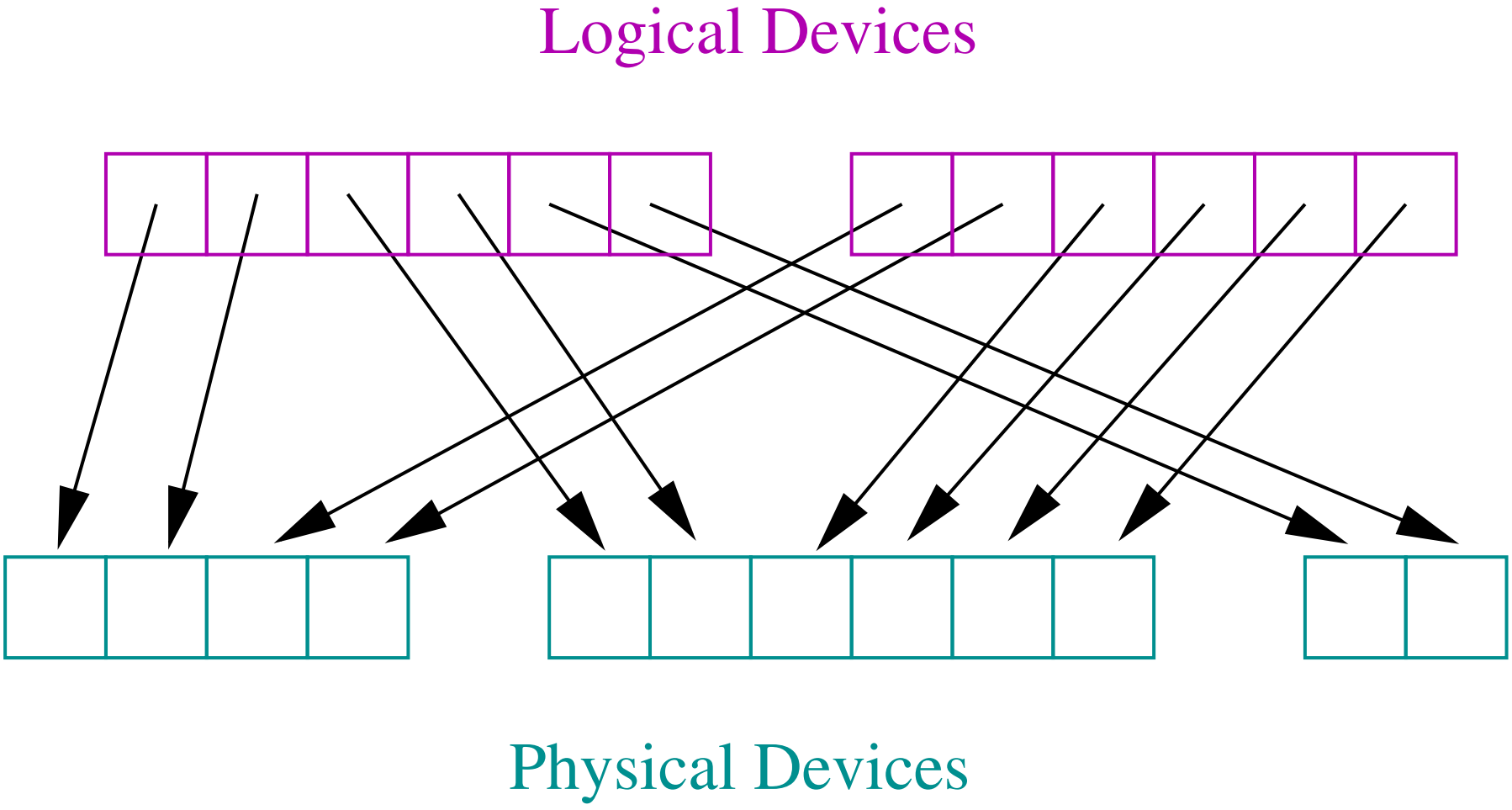
Storage Virtualization

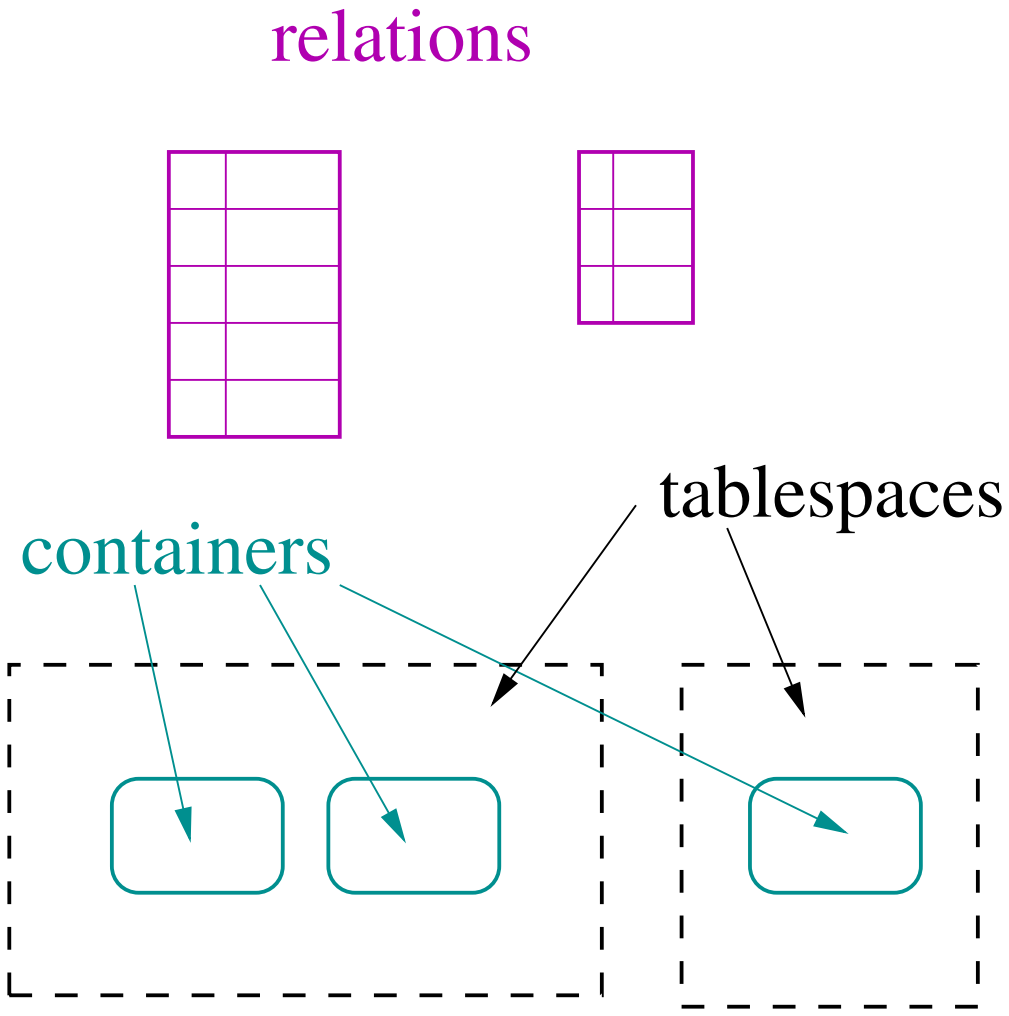
Logical Devices

Physical Devices

Storage Virtualization



DBMS Storage Mapping



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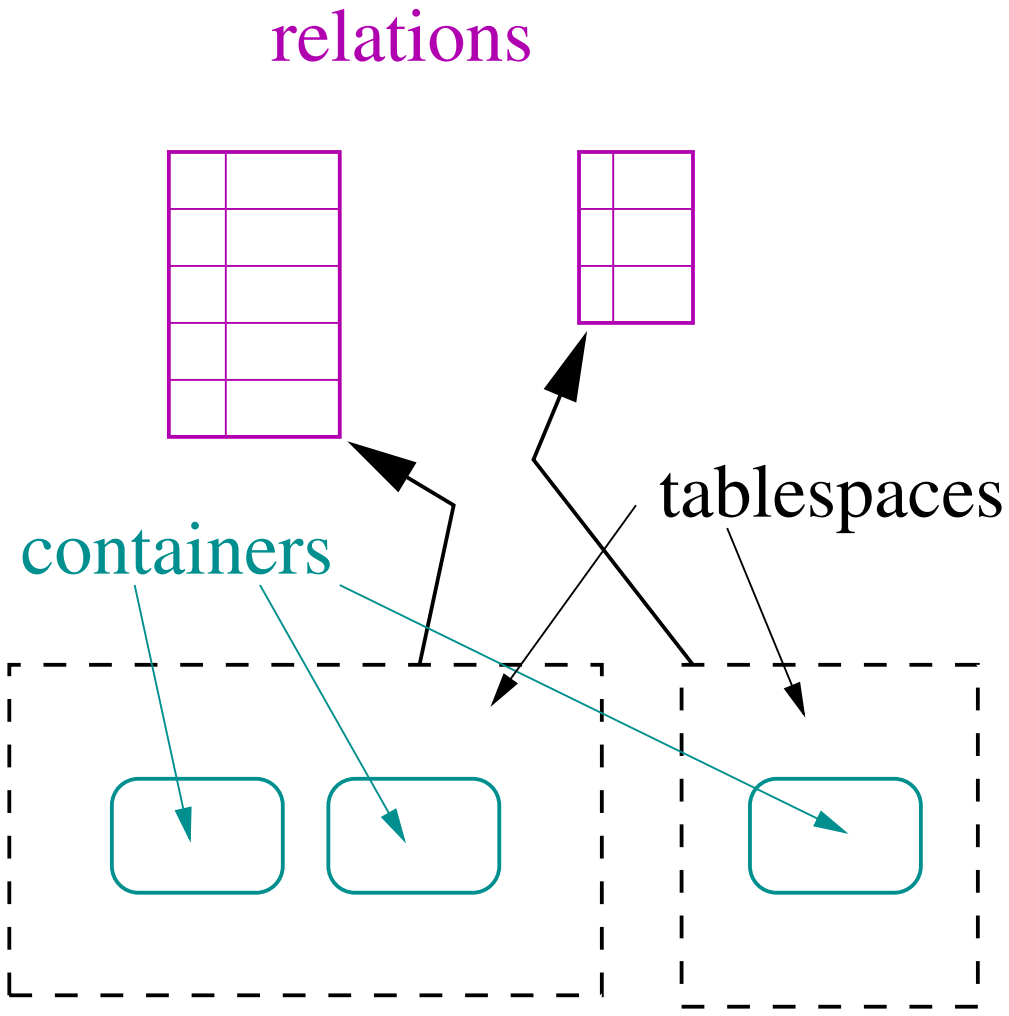
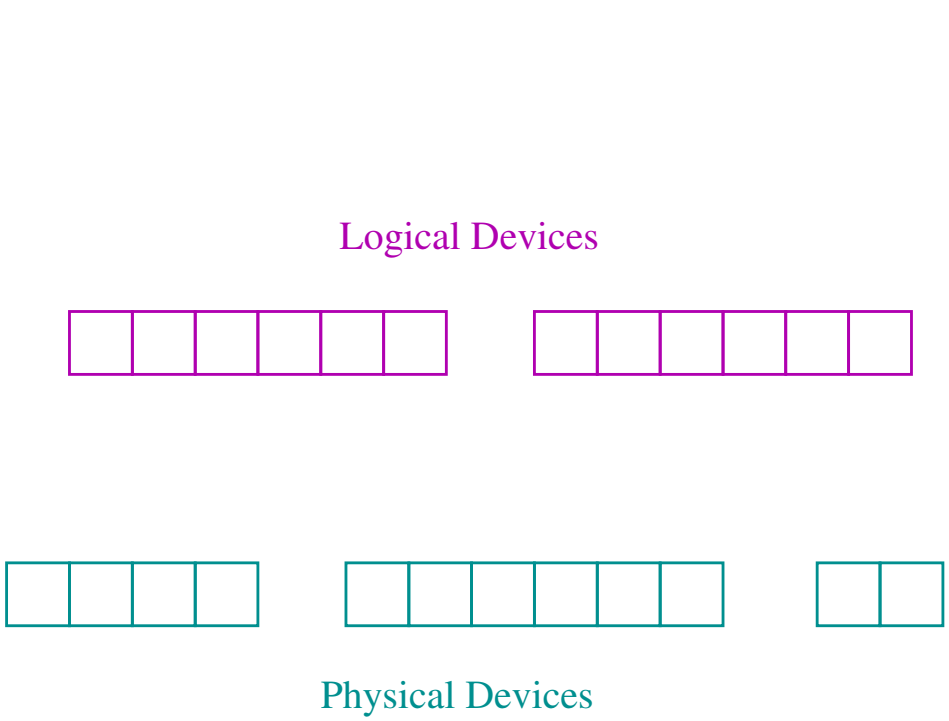
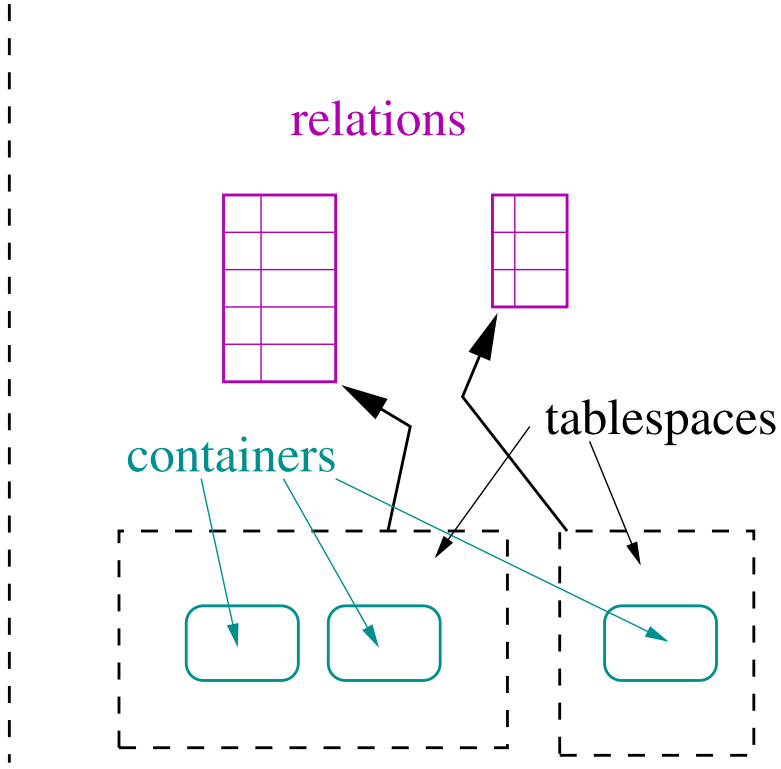


Virtualization Mapping in SVN





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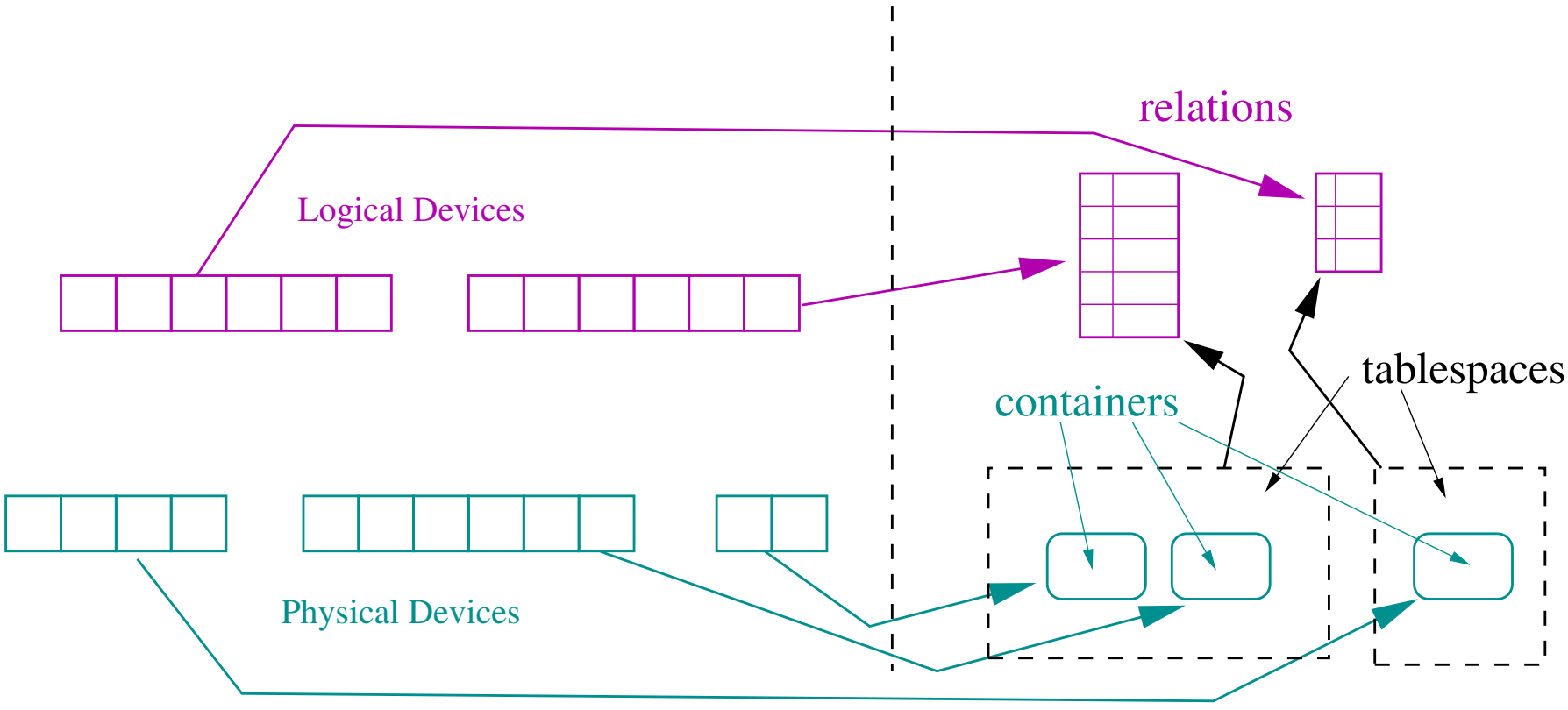

SVN Table Block Vectors

number	data
1	1 2 3 4 5
6	6 7 8 9 10
11	11 12 13 14 15
16	16 17 18 19 20

- k logical blocks per tuple ($k = 5$ in example)

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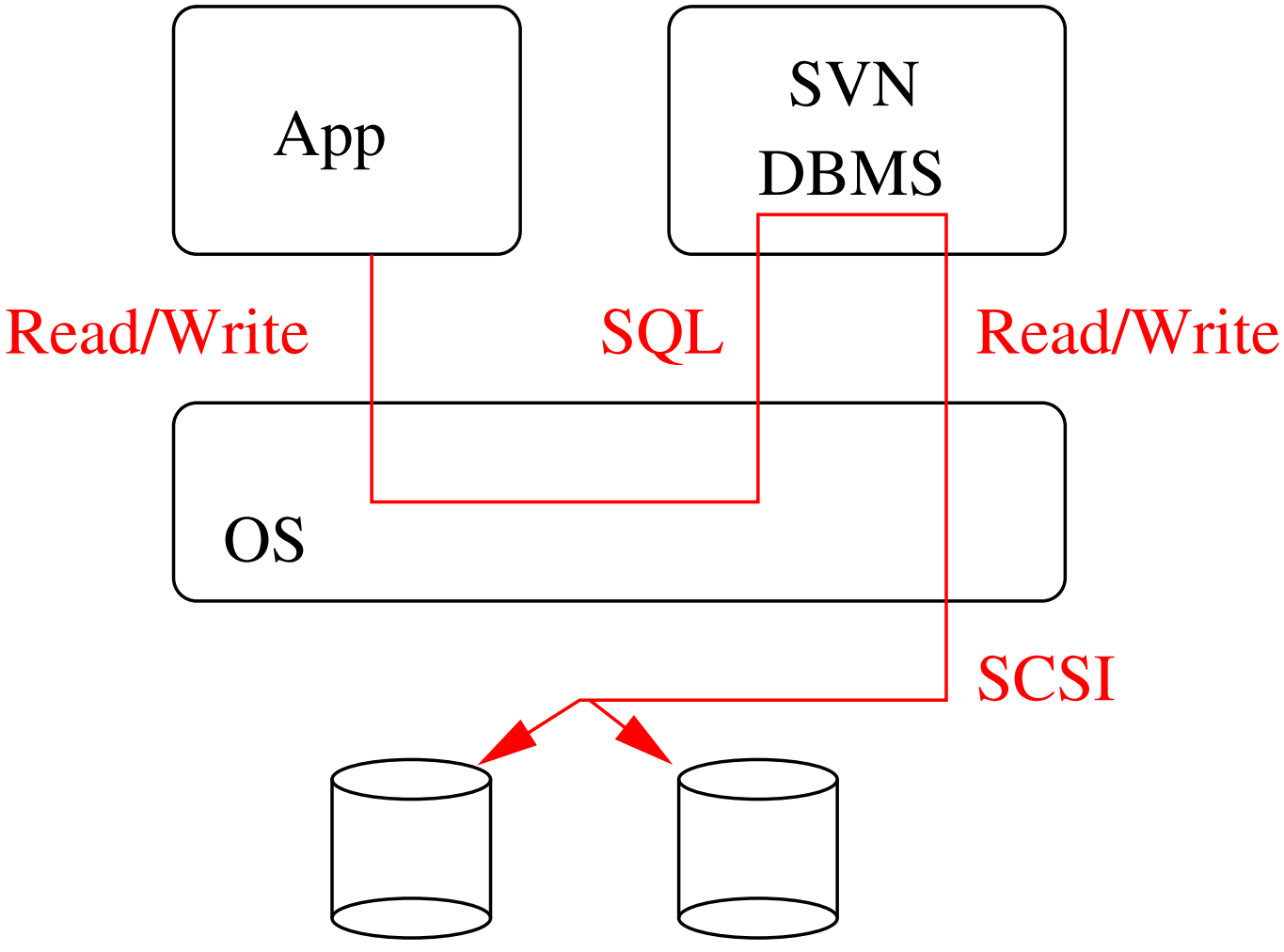
Block Read Procedure

Read block x from logical device $i \Rightarrow$
SELECT data FROM T_i WHERE number = x/k

SVN Control Path



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DECONCAT SQL scalar function: like CONCAT, but for Writes

Bonus Features

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Warning

These transformations turn fixed-length data into variable-length data. This breaks Table Direct Access.

Experimental Results

- experiments compared SVM to “virtual shared disk” (VSD) in AIX
- workload provided by several block I/O request traces
- SVM had 10GB tablespace and two raw device containiners. VSD had one 10GB logical device from two physical devices.

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- Without optimizations, SVM required 30 times more CPU time than VSD on reads and writes.
- With all optimizations, SVM and VSD CPU times were comparable (12% slowdown on writes). SVM had about a 40% latency penalty on writes, 0-10% for reads.

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- Storage virtualization is more than a mechanism for logical-to-physical mapping. (Provisioning, management/admin tools...) Does DBMS implementation help with these?
- How flexible are tablespace mappings in DBMS?