Quiz 8 Solution
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Author A
Writes W
Book B
Copy Co
Library L
Loan Lo
Customer Cu
1. Find the libnum of libraries that contain a copy of a book written by George Saunders.

\[-\Pi \; \text{libnum} \left( \sigma \text{first} = \text{‘George’} \text{ and last} = \text{‘Saunders’} \; (A \bowtie W \bowtie B \bowtie Co ) \right)\]

\[-\Pi \; \text{libnum} \left( \sigma \text{first} = \text{‘George’} \text{ and last} = \text{‘Saunders’} \; (A \bowtie W \bowtie Co ) \right)\]
2. Find the names of customers who have never borrowed a book longer than 200 pages.

\[
- \ \pi \ \text{first, last}\left(\pi \ \text{cid, first, last} \ Cu\right) - \ \pi \ \text{cid, first, last}\left(\sigma_{\text{pages} > 200} \left( Cu \ \bowtie \ Lo \ \bowtie \ Co \ \bowtie \ B \right)\right)
\]
3. Find the names of customers who have borrowed at least one copy of a book written by Hannah Arendt and at least one copy of a book written by Isaiah Berlin.

\[
\pi \text{ first, last } (Cu \bowtie ((\pi \text{ cid}(\sigma \text{ first} = \text{‘Hannah’ and last = ‘Arendt’ } (Lo \bowtie Co \bowtie W \bowtie A ))) \cap \\
(\pi \text{ cid}(\sigma \text{ first} = \text{‘Isaiah’ and last = ‘Berlin’ } (Lo \bowtie Co \bowtie W \bowtie A )))))
\]