Pázmány Péter Catholic University
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3NF lossless, dependency preserving decomposition

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Database Systems I. Seminar

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Recap

- 3NF
- Decomposition
- FD
- FD projection
- Lossless decomposition
- Dependency preserving decomposition
- 3NF decomposition algorithm

Problems

1. Decompose the following schema to 3NF!
   R = (A, B, C, D, E, F, G, H, I, J)
   F_c={ A→B, A→E, A→D, AC→G }
2. Decompose the following schema to 3NF!
   R(A, B, C, D, E, G)
   F_c={ A→B, A→G, C→D, C→E, G→E }
3. Decompose the following schema to 3NF!
   R=(A, B, C, D, E, F)
   F_c={A→B, A→C, B→A , BD→E, BD→F}
4. Find the minimal cover for the FD set F! Are F and F_c equivalent? Explain!
   F={ A→B, A→C, B→C, A→B, AB→C, BD→A}
5. Find the minimal cover for the FD set F!
   F = { A→BC, ACD→E, B→D, C→D, AB→E, E→BC}
6. Find the minimal cover for the FD set F!
   F={A→E, AD→BE, AC→E, E→B, BG→F, BE→D, BDH→E, F→A, D→H, CD→A}

Solutions

1. $R_1(\underline{A},B,E,D)$, $R_2(\underline{A},\underline{C},G)$, $R_3(\underline{A},\underline{C},\underline{F},\underline{H},\underline{I},\underline{J})$
   ($R_4(\underline{F},\underline{H},\underline{I},\underline{J})$ can be eliminated because it is a subset of R_3)
2. $R_1(\underline{A},B,G)$, $R_2(\underline{C},D,E)$, $R_3(\underline{G},E)$, $R_4(\underline{A},\underline{C})$
3. $R_1(\underline{A},B,C)$, $R_2(\underline{B},A)$, $R_3(\underline{B},\underline{D},E,F)$
4. $F_- = \{ A \rightarrow B,\ B \rightarrow C,\ BD \rightarrow A \}$
5. $F_- = \{ A \rightarrow E,\ B \rightarrow D,\ C \rightarrow D,\ E \rightarrow B,\ E \rightarrow C \}$
6. $F_- = \{ A \rightarrow E,\ BD \rightarrow E,\ BG \rightarrow F,\ CD \rightarrow A,\ D \rightarrow H,\ E \rightarrow B,\ E \rightarrow D,\ F \rightarrow H \}$