Project 7 - Ally Smith

Schema:

$R = \{$composer, era, era_dates, birthplace, continent, work, setting$\}$

Dependencies:

$$
\begin{aligned}
\{\text{composer}\} &\rightarrow \{\text{birthplace}\} \\
\{\text{composer, work}\} &\rightarrow \{\text{setting}\} \\
\{\text{era}\} &\rightarrow \{\text{era\_dates}\} \\
\{\text{birthplace}\} &\rightarrow \{\text{continent}\}
\end{aligned}
$$

Step 1

1. Starting relation: R

2. Decompose on $\{$birthplace$\} \rightarrow \{$continent$\}$

3. Results:
   $R1 = \{$composer, era, era_dates, birthplace, work, setting$\}$
   $R2 = \{$birthplace, continent$\}$

Step 2

1. Starting relation: $R1$

2. Decompose on $\{$composer$\} \rightarrow \{$birthplace$\}$

3. Results:
   $R3 = \{$composer, era, era_dates, work, setting$\}$
   $R4 = \{$composer, birthplace$\}$

Step 3

1. Starting relation: $R3$

2. Decompose on $\{$era$\} \rightarrow \{$era_dates$\}$

3. Results:
   $R5 = \{$composer, era, work, setting$\}$
   $R6 = \{$era, era_dates$\}$

Step 4

1. Starting relation: $R5$

2. Decompose on {composer, work} $\rightarrow$ {setting}

3. Results:
$$\begin{aligned} R7 &= \quad \{\text{composer, era, work}\} \\ R8 &= \quad \{\text{composer, work, setting}\} \end{aligned}$$

Extra Credit

1. Starting relation: $R7$

2. Decompose on {composer} $\twoheadrightarrow$ {era | work}

3. Results:
$$\begin{aligned} R9 &= \quad \{\text{composer, era}\} \\ R10 &= \quad \{\text{composer, work}\} \end{aligned}$$

Final Database

- $R2 = \{\text{birthplace, continent}\}$, only FD is {birthplace} $\rightarrow$ {continent}

- $R4 = \{\text{composer, birthplace}\}$, only FD is {composer} $\rightarrow$ {birthplace}

- $R6 = \{\text{era, era\_dates}\}$, only FD is {era} $\rightarrow$ {era_dates}

- $R8 = \{\text{composer, work, setting}\}$, only FD is
{composer, work} $\rightarrow$ {setting}

- $R9 = \{\text{composer, era}\}$, only FD is {composer} $\twoheadrightarrow$ {era}

- $R10 = \{\text{composer, work}\}$, only FD is {composer} $\twoheadrightarrow$ {work}