1 TikZ-pf

Some problem frames provided as examples to show the usage.
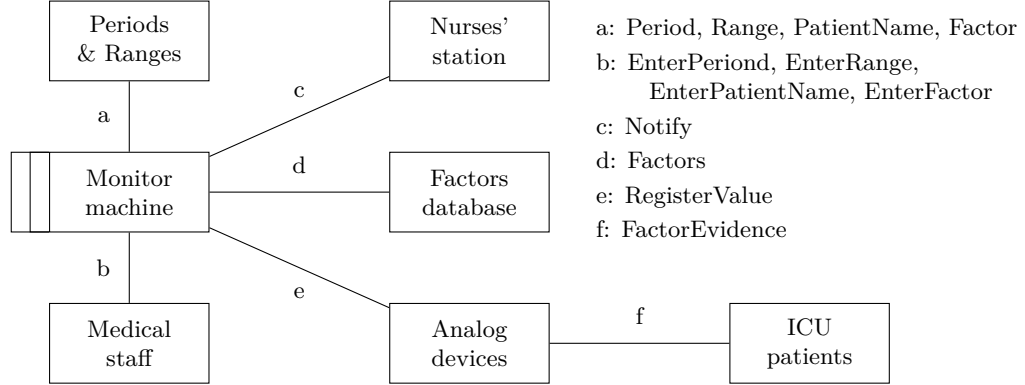
1.1 Context Diagram

Figure 1: Context Diagram: Patient Monitoring System (cf. Jackson, 2001)

```
\begin{tikzpicture}
        %\draw[help lines, step=1cm,gray] (-2,-3) grid
           (12,3);

        \domain[x=0,y=0,type=machine]{m}{Monitor machine
           };
        \domain[x=0,y=2,type=designedDomain]{pr}{Periods
           \& Ranges};

        \domain[x=0,y=-2]{ms}{Medical staff};
        \domain[x=4.5,y=2]{ns}{Nurses' station};
        \domain[x=4.5,y=0]{fd}{Factors database};
        \domain[x=4.5,y=-2]{ad}{Analog devices};
        \domain[x=9,y=-2]{icu}{ICU patients};

        \connects[label position=left]{m}{pr}{a}
        \connects[label position=left]{m}{ms}{b}
        \connects{m}{ns}{c}
        \connects{m}{fd}{d}
        \connects[label position=below]{m}{ad}{e}
        \connects{ad}{icu}{f}
```

```
        \begin{scope}[align=flush left, text width=60mm,
           font=\small]
                \node at (9,1) {
                \begin{description}
                \itemsep0em
                \item a: Period, Range, PatientName,
                    Factor
                \item b: EnterPeriond, EnterRange,
                    EnterPatientName, EnterFactor
                \item c: Notify
                \item d: Factors
                \item e: RegisterValue
                \item f: FactorEvidence
                \end{description}
                };
        \end{scope}
\end{tikzpicture}
```

1.2 Problem Frames

1.2.1 Required Behaviour
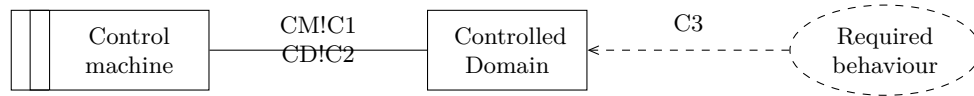

Figure 2: Required Behaviour Problem Frame (cf. Jackson, 2001)

```
\begin{tikzpicture}

        \domain[x=0,y=0,type=machine]{m}{Control machine
            };
        \domain[x=5,y=0,type=casualDomain]{cd}{Controlled
            Domain};

        \connects[yshift=-12pt]{m}{cd}{CM!C1\\ CD!C2}

        \requirement[x=10,y=0]{r}{Required behaviour};

        \constrains{r}{cd}{C3}

\end{tikzpicture}
```
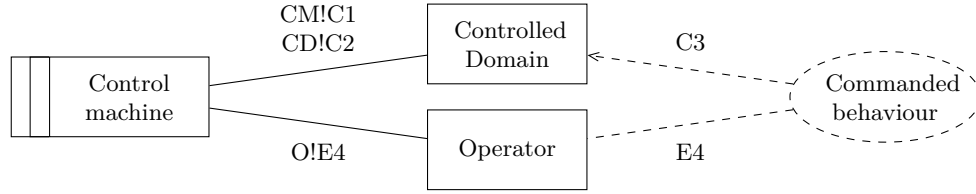
Figure 3: Commanded Behaviour Problem Frame (cf. Jackson, 2001)

1.2.2 Commanded Behaviour

```
\begin{tikzpicture}

        \domain[x=0,y=0,type=machine]{m}{Control machine
            };
        \domain[x=5,y=.7,type=casualDomain]{cd}{
            Controlled Domain};
        \domain[x=5,y=-.7,type=biddableDomain]{o}{
            Operator};

        \connects{m}{cd}{CM!C1\\ CD!C2}
        \connects[label position=below]{m}{o}{O!E4}

        \requirement[x=10,y=0]{r}{Commanded behaviour};

        \constrains{r}{cd}{C3}
        \refers[label position=below]{r}{o}{E4}

\end{tikzpicture}
```
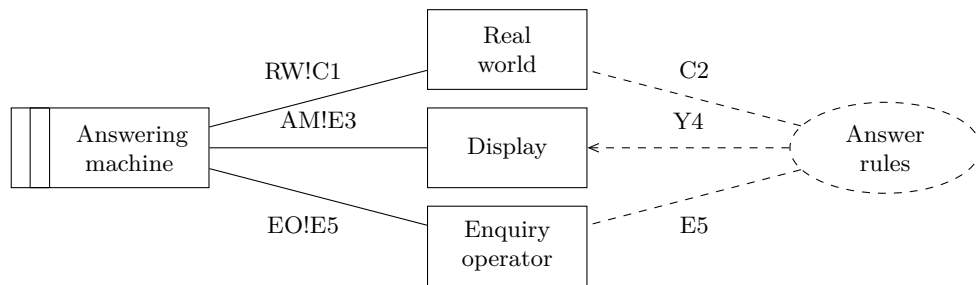
1.2.3 Commanded Information

Figure 4: Commanded Information Problem Frame (cf. Jackson, 2001)

```
|\begin{tikzpicture}
```

```
\domain[x=0,y=0,type=machine]{m}{Answering
    machine};
\domain[x=5,y=1.3,type=casualDomain]{rw}{Real
    world};
\domain[x=5,y=0,type=casualDomain]{d}{Display};
\domain[x=5,y=−1.3,type=biddableDomain]{eo}{
    Enquiry operator};

\connects[xshift=−2mm]{m}{rw}{RW!C1}
\connects{m}{d}{AM!E3}
\connects[label position=below,xshift=−2mm]{m}{eo
    }{EO!E5}

\requirement[x=10,y=0]{r}{Answer rules};

\refers{r}{rw}{C2}
\constrains{r}{d}{Y4}
\refers[label position=below]{r}{eo}{E5}

\end{tikzpicture}
```
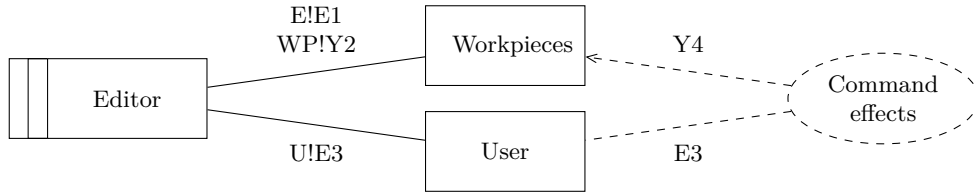
1.2.4   Simple Workpiece

Figure 5: Simple Workpiece Problem Frame (cf. Jackson, 2001)

```
\begin{tikzpicture}

\domain[x=0,y=0,type=machine]{m}{Editor};
\domain[x=5,y=.7,type=lexicalDomain]{w}{
    Workpieces};
\domain[x=5,y=−.7,type=biddableDomain]{u}{User};

\connects{m}{w}{E!E1\\ WP!Y2}
\connects[label position=below]{m}{u}{U!E3}

\requirement[x=10,y=0]{r}{Command effects};
```

```
        \constrains{r}{w}{Y4}
        \refers[label position=below]{r}{u}{E3}

\end{tikzpicture}
```

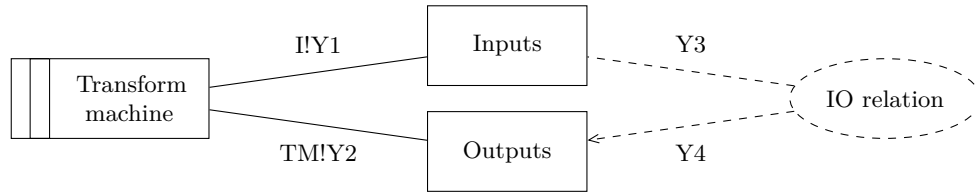### 1.2.5 Transformation

Figure 6: Transformation Problem Frame (cf. Jackson, 2001)

```
\begin{tikzpicture}

        \domain[x=0,y=0,type=machine]{m}{Transform
            machine};
        \domain[x=5,y=.7,type=lexicalDomain]{i}{Inputs};
        \domain[x=5,y=-.7,type=lexicalDomain]{o}{Outputs
            };

        \connects{m}{i}{I!Y1}
        \connects[label position=below]{m}{o}{TM!Y2}

        \requirement[x=10,y=0]{r}{IO relation};

        \constrains[label position=below]{r}{o}{Y4}
        \refers{r}{i}{Y3}

\end{tikzpicture}
```

References

Jackson, M. (2001). "Problem frames: analysing and structuring software development problems". In: (cit. on pp. 1–5).