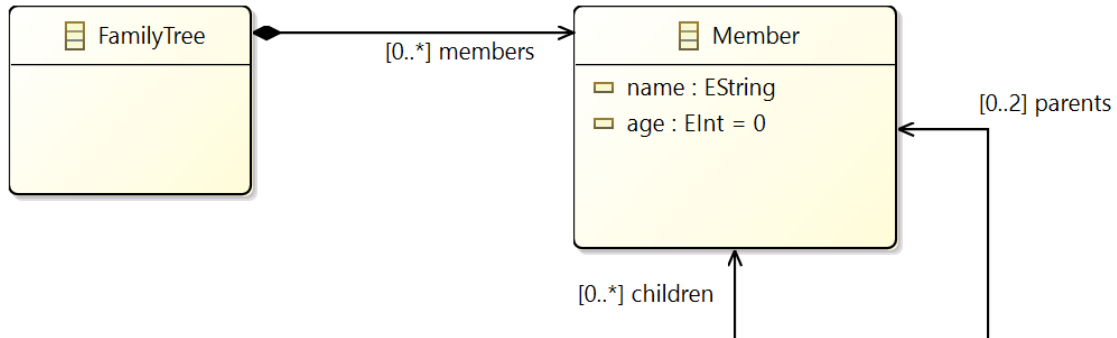


Metamodel



Numerical Constraint

```

@Constraint(message="parentTooYoung", severity="error", key={m, p})
pattern parentTooYoung(m: Member, p: Member) = {
    FamilyTree.members(_, m);
    Member.parents(m, p);
    Member.age(m, mAge);
    Member.age(p, pAge);
    check (mAge > (pAge + 12));
}
  
```

Mathematical Formulation of the Constraint

$$\begin{aligned}
 \forall m, p [\text{pty}(m, p)]_Z^M &\Leftrightarrow \text{ptygreen}(m, p) \wedge \text{ptyyellow}(m, p) \\
 \forall m, p [\text{ptygreen}(m, p)]_Z^M &\Leftrightarrow \text{member}(m, FTM) \wedge \text{member}(p, FTM) \wedge \text{parent}(p, m) \\
 \forall m, p [\text{ptyyellow}(m, p)]_Z^M &\Leftrightarrow \text{age}(m, \text{mage}) \wedge \text{age}(p, \text{page}) \wedge [\text{mage} + 12 > \text{page}] \\
 \forall m, p \neg(\text{ptygreen}(m, p) \Rightarrow \text{ptyyellow}(m, p))
 \end{aligned}$$