$[PERSON]$

$GENDER ::= male \mid female$

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**GenDB**

$parent : PERSON \leftrightarrow PERSON$
$sex : PERSON \nrightarrow GENDER$

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$\mathrm{dom}\, parent \cup \mathrm{ran}\, parent \subseteq \mathrm{dom}\, sex$
$\forall\, p : PERSON \bullet p \mapsto p \notin parent^{+}$
$\forall\, p, q, r : PERSON \bullet \{p \mapsto q, p \mapsto r\} \subseteq parent$
$\wedge\, q \neq r \Rightarrow sex\, q \neq sex\, r$

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**InitGenDB**

$GenDB'$

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$sex' = \emptyset$
$parent' = \emptyset$

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**AddPerson**

$\Delta GenDB$
$name? : PERSON$
$morf? : GENDER$

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$name? \notin \mathrm{dom}\, sex$
$sex' = sex \cup \{name? \mapsto morf?\}$
$parent' = parent$

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**AddRel**

$\Delta GenDB$
$off?, par? : PERSON$

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$\{off?, par?\} \subseteq \mathrm{dom}\, sex$
$off? \mapsto par? \notin parent$
$par? \mapsto off? \notin parent$
$\#(\{off?\} \lhd parent) \leq 1$
$\forall\, x : PERSON \bullet off? \mapsto x \in parent \Rightarrow sex\, x \neq sex\, par?$
$sex' = sex$

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$\quad$_ *ChangeName* _____
$\Delta GenDB$
$old?, new? : PERSON$

$old? \in \mathrm{dom}\ sex$
$new? \notin \mathrm{dom}\ sex$
$sex' = (\{old?\} \lhd sex) \cup \{new? \mapsto sex\ old?\}$
$parent' = (\{old?\} \lhd parent \rhd \{old?\})$
$\cup \{x : PERSON \mid x \in parent(\!|\ \{old?\}\ |\!) \bullet new? \mapsto x\}$
$\cup \{x : PERSON \mid x \notin parent^{\sim}(\!|\ \{old?\}\ |\!) \bullet x \mapsto new?\}$

$\quad$_ *ChangeSex* _____
$\Delta GenDB$
$p? : PERSON$

$p? \in \mathrm{dom}\ sex$
$sex' = sex \oplus$
$(\{q : PERSON;\ s : GENDER \mid$
$((q \in (parent^{\sim} \mathbin{\stackrel{\circ}{,}} parent)^{+}(\!|\ \{p?\}\ |\!)) \wedge (s \neq sex\ q) \bullet q \mapsto s\})$
$parent' = parent$

$\quad$_ *CommonAncestors* _____
$\Xi GenDB$
$p?, q? : PERSON$
$cas! : \mathbb{P}\ PERSON$

$\{p?, q?\} \cup cas! \subseteq \mathrm{dom}\ sex$
$cas! = \{ca : PERSON \mid \exists\, m, n : \mathbb{N} \bullet$
$((p? \mapsto ca \in parent^n \wedge q? \mapsto ca \in parent^m)$
$\wedge \neg\, \exists\, r : PERSON;\ x, y : \mathbb{N} \bullet ((x + y < m + n)$
$\wedge p? \mapsto r \in parent^x \wedge q? \mapsto r \in parent^y))\}$

$\quad$_ *Cousins* _____
$\Xi GenDB$
$p? : PERSON$
$nth? : \mathbb{N}_1$
$rem? : \mathbb{N}$
$cousins! : \mathbb{P}\ PERSON$

$\{p?\} \cup cousins!\ \mathrm{dom}\ sex$
**let** $cosrel == (parent^{nth?+1} \mathbin{\stackrel{\circ}{,}} (parent^{\sim})^{nth?+1+rem?}) \setminus (parent \mathbin{\stackrel{\circ}{,}} parent^{\sim}) \bullet$
$cousins! = cosrel(\!|\ \{p?\}\ |\!) \cup cosrel^{\sim}(\!|\ \{p?\}\ |\!)$