

[CHAR]

NUMBER ::= seq CHAR

PASSWORD ::= seq CHAR

RESPONSE ::= Success|Failed

CARDTYPE ::= saving|credit

locktime: \mathbb{N}
nullnum: NUMBER
dailylimit: \mathbb{R}

locktimes = 3
nullsession = ""
dailylimit = 10000

AccountDatabase

numberlist: $\mathbb{N}1 \rightarrow \text{NUMBER}$
passwords: $\text{NUMBER} \rightarrow \text{PASSWORD}$
balances: $\text{NUMBER} \rightarrow \mathbb{R}$
dailytransfer: $\text{NUMBER} \rightarrow \mathbb{R}$
cardtypes: $\text{NUMBER} \rightarrow \text{CARDTYPE}$
naccounts: \mathbb{N}

dom passwords = ran numberlist
dom balances = ran numberlist
 $\forall i, j: 1..naccounts \cdot i \neq j \Rightarrow \text{numberlist}(i) \neq \text{numberlist}(j)$
 $\forall i: 1..naccounts \cdot \text{cardtypes}(\text{numberlist}(i)) = \text{saving} \Rightarrow \text{balance}(\text{numberlist}(i)) \geq 0,$
 $\text{cardtypes}(\text{numberlist}(i)) = \text{credit} \Rightarrow \text{balance}(\text{numberlist}(i)) \leq 0 \wedge \text{balance}(\text{numberlist}(i)) \geq -\text{credit}$

AccountDatabaseInstance

AccountDatabase
failloginlock: \mathbb{N}
session: NUMBER

session = nullnum
failloginlock = 0

Login

Δ AccountDatabaseInstance

number?: NUMBER
password?: PASSWORD
response!: RESPONSE

$((\text{failloginlock} \geq \text{locktimes} \vee (\text{failloginlock} < \text{locktimes} \wedge (\text{number?} \notin \text{dom} \vee (\text{number?} \in \text{dom} \wedge \text{password?} \neq \text{passwords}(\text{number?})))) \wedge \text{response!} = \text{Failed} \wedge \text{session}' = \text{nullsession})$

$\vee (\text{failloginlock} < \text{locktimes} \wedge \text{number?} \in \text{dom numberlist} \wedge \text{password?} = \text{passwords}(\text{number?}) \wedge \text{response!} = \text{Success} \wedge \text{session}' = \text{number?})$

Transfer

Δ AccountDatabaseInstance

transmoney?: \mathbb{R}

target?: NUMBER

result!: RESPONSE

$(\text{result!} = \text{Success} \wedge (\text{balances}' = \text{balances} \oplus (\text{session} \mapsto \text{balances}(\text{session}) - \text{transmoney?}) \oplus (\text{target?} \mapsto \text{balances}(\text{target?}) + \text{transmoney?})) \wedge \text{session!} = \text{nullsession} \wedge (((\text{cardtypes}(\text{session}) = \text{saving}) \wedge \text{transmoney?} \leq \text{balances}(\text{session}) \wedge (\text{transmoney?} > 0)) \vee ((\text{cardtypes}(\text{session}) = \text{credit}) \wedge (\text{transmoney?} \leq -\text{balances}(\text{session})) \wedge (\text{transmoney?} > 0))) \wedge ((\text{target?} = \text{?session}) \vee ((\text{target?} \neq \text{session}) \wedge (\text{target?} \in \text{dom numberlist}) \wedge (\text{transmoney?} \leq \text{dailylimit} - \text{dailytransfer}(\text{session})))))$
 $\vee (\text{result!} = \text{Failed} \wedge \neg(\text{balances}' = \text{balances} \oplus (\text{session} \mapsto \text{balances}(\text{session}) - \text{transmoney?}) \oplus (\text{target?} \mapsto \text{balances}(\text{target?}) + \text{transmoney?})) \wedge \text{session!} = \text{nullsession} \wedge (((\text{cardtypes}(\text{session}) = \text{saving}) \wedge \text{transmoney?} \leq \text{balances}(\text{session}) \wedge (\text{transmoney?} > 0)) \vee ((\text{cardtypes}(\text{session}) = \text{credit}) \wedge (\text{transmoney?} \leq -\text{balances}(\text{session})) \wedge (\text{transmoney?} > 0))) \wedge ((\text{target?} = \text{?session}) \vee ((\text{target?} \neq \text{session}) \wedge (\text{target?} \in \text{dom numberlist}) \wedge (\text{transmoney?} \leq \text{dailylimit} - \text{dailytransfer}(\text{session})))))$