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$$FriendStatus ::= Confirmed \mid RequestSent \mid RequestSent$$
$$ParcelStatus ::= Uninitiated \mid RendezvousRequested \mid RendezvousAccepted \mid WithCourier \mid Completed$$
$$Bool ::= True \mid False$$
$$[Char]$$
$$[User]$$
$$[Parcel]$$
$$String == seqChar$$

UserManager

$$UserId : User \mapsto \natural$$
$$UserName : User \mapsto String$$
$$UserParcels : User \mapsto \mathbb{P}\, Parcel$$
$$UserFriends : User \mapsto \mathbb{P}\, User$$
$$UserFriendStatus : \{User, User\} \mapsto FriendStatus$$
$$UserCourier : User \mapsto Bool$$
$$UserLat : User \mapsto \mathbb{R}$$
$$UserLng : User \mapsto \mathbb{R}$$
$$UserRating : User \mapsto \mathbb{Z}$$
$$UserRatable : User \mapsto \text{bag}\ User$$
$$UserDistance : \{User, User, User\} \mapsto \mathbb{R}$$

ParcelManager

$$ParcelId : Parcel \mapsto \natural$$
$$ParcelDescription : Parcel \mapsto String$$
$$ParcelStatus : Parcel \mapsto ParcelStatus$$
$$ParcelDestination : Parcel \mapsto User$$
$$ParcelSource : Parcel \mapsto User$$
$$ParcelCarrier : Parcel \mapsto User$$
$$ParcelLat : User \mapsto \mathbb{R}$$
$$ParcelLng : User \mapsto \mathbb{R}$$
$$ParcelTime : User \mapsto \natural$$

Server

$$Users : \mathbb{P}\, User$$
$$Parcels : \mathbb{P}\, Parcel$$
$$UserParcels : User \mapsto \mathbb{P}\, Parcel$$

RequestFriend

$\Delta UserManager$
$s? : User$
$r? : User$

$r? \notin UserFriends\ s?$
$UserFriendStatus' = UserFriendStatus \cup \{s?, r?\} \mapsto RequestSent$
$UserFriendStatus' = UserFriendStatus \cup \{r?, s?\} \mapsto RequestReceived$
$UserFriends'\ s? = UserFriends\ s? \cup \{r?\}$
$UserFriends'\ r? = UserFriends\ s? \cup \{s?\}$

FriendResponse

$\Delta UserManager$
$s? : User$
$r? : User$
$response? : Bool$

$UserFriendStatus\{r?, s?\} = RequestReceived$
$(response? = True \land$
$\quad UserFriendStatus'\ \{r?, s?\} \mapsto confirmed \land$
$\quad UserFriendStatus'\ \{r?, s?\} \mapsto confirmed)$
$\lor\ (UserFriendStatus'\ \{r?, s?\} \mapsto \emptyset \land$
$\quad UserFriendStatus'\ \{r?, s?\} \mapsto \emptyset \land$
$\quad UserFriends'\ s? = UserFriends\ s? \setminus \{r?\} \land$
$\quad UserFriends'\ r? = UserFriends\ r? \setminus \{s?\})$

RequestRendezvous

$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$

$UserFriendStatus\{r?, s?\} = Confirmed$
$p? \in UserParcels\ s?$
$ParcelStatus\ p? = Uninitiated \lor ParcelStatus\ p? = WithCourier$
$ParcelStatus'\ p? = RendezvousRequested$

RendezvousResponse

$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$
$response? : Bool$

$UserFriendStatus\{r?, s?\} \mapsto confirmed$
$p? \in UserParcels\ s?$
$p? \in UserParcels\ r?$
$(response? = True \land ParcelStatus'\ p? = RendezvousAccepted) \lor$
$\quad ((ParcelCarrier\ p? = ParcelSource\ p? \land ParcelStatus'\ p? = Uninitiated) \lor$
$\quad\quad (ParcelStatus'\ p? = WithCourier))$

FinalizeExchange

$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$

$UserFriendStatus\{r?, s?\} \mapsto confirmed$
$p? \in UserParcels\ s?$
$UserParcels'\ s? = UserParcels\ s? \setminus \{p?\}$
$UserParcels'\ r? = UserParcels\ r? \cup \{p?\}$
$(ParcelDestination\ p? = r?$
$\quad \land ParcelStatus'\ p? \mapsto completed)$
$\lor ParcelStatus'\ p \mapsto WithCourier$

InitiateCourier

$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$
$!courier : User$

$UserFriendStatus\{r?, s?\} \mapsto confirmed$
$\exists\, c : User \in (UserFriends\ s? \cap UserFriends\ r? \land$
$\quad UserFriendStatus\{r?, c?\} = confirmed \land UserFriendStatus\{s?, c?\} = confirmed \land$
$\quad UserCourier\ c? = True)$
$p? \in UserParcels\ s?$
$ParcelStatus\ p? \mapsto uninitiated$
$UserParcels'\ r? = UserParcels'\ r? \cup \{p?\}$
$!courier = u1 : User \in (UserFriends\ s? \cap UserFriends\ r?) \land$
$\quad UserCourier\ u1 = True \land UserFriendStatus\{r?, u1\} = confirmed \land$
$\quad UserFriendStatus\{s?, u1\} = confirmed \land$
$\quad (\forall\, u2 : User \in (UserFriends\ s? \cap UserFriends\ r?) \land$
$\quad\quad UserCourier\ u2 = True \land UserFriendStatus\{r?, u2\} = confirmed \land$
$\quad\quad UserFriendStatus\{s?, u2\} = confirmed \land$
$\quad\quad UserDistance\{s?, u1, r?\} \leq UserDistance\{s?, u2, r?\})$

IsFriendWith

$\Delta UserManager$
$s? : User$
$r? : User$
$res! : Bool$

$res! = UserFriendStatus\{r?, s?\} \mapsto confirmed$

IsRatable

$\Delta UserManager$
$s? : User$
$r? : User$
$res! : Bool$

$res! = (UserFriendStatus\{r?, s?\} \mapsto confirmed \land$
$\quad r?\ \text{in}\ UserRatable\ s?)$

Rate

$\Delta UserManager$
$s? : User$
$r? : User$
$up? : Bool$

$UserFriendStatus\{r?, s?\} \mapsto confirmed$
$r?$ in $UserRatable\ s?$
$(up? = True \land UserRating'\ r? = UserRating\ r? + 1) \lor$
$\quad (UserRating'\ r? = UserRating\ r? - 1)$
$UserRatable'\ s? = UserRatable'\ s? \cup [\![r?]\!]$