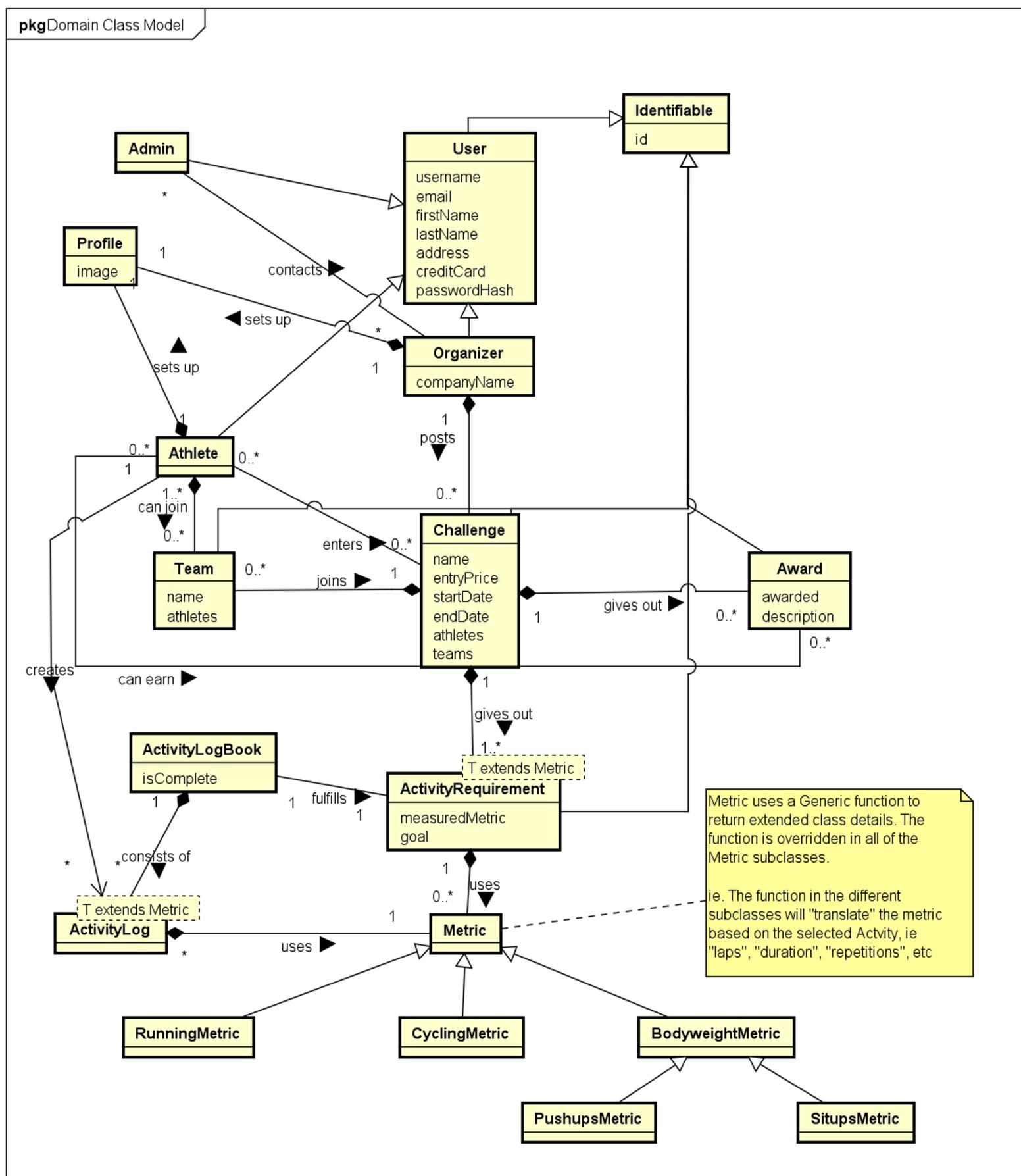
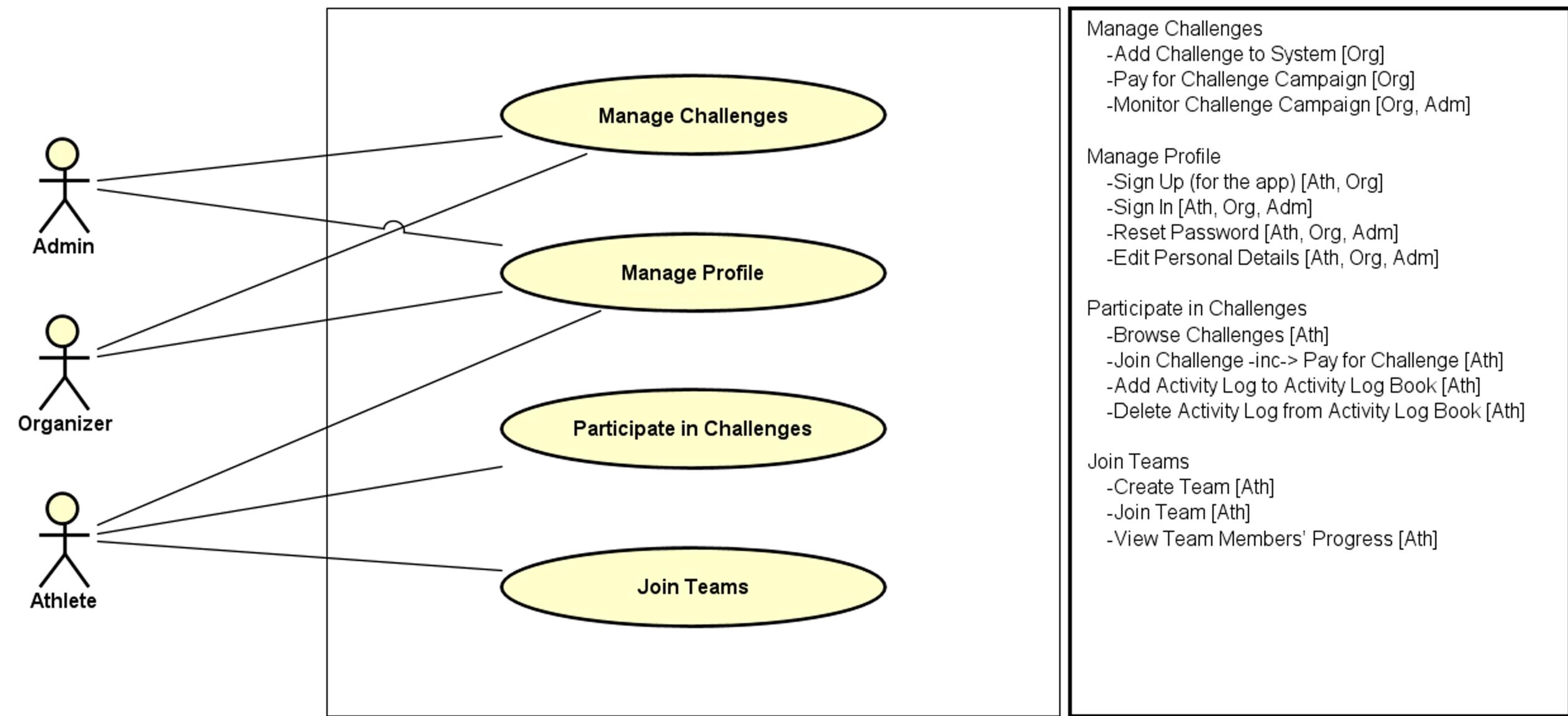


## Design Documents:

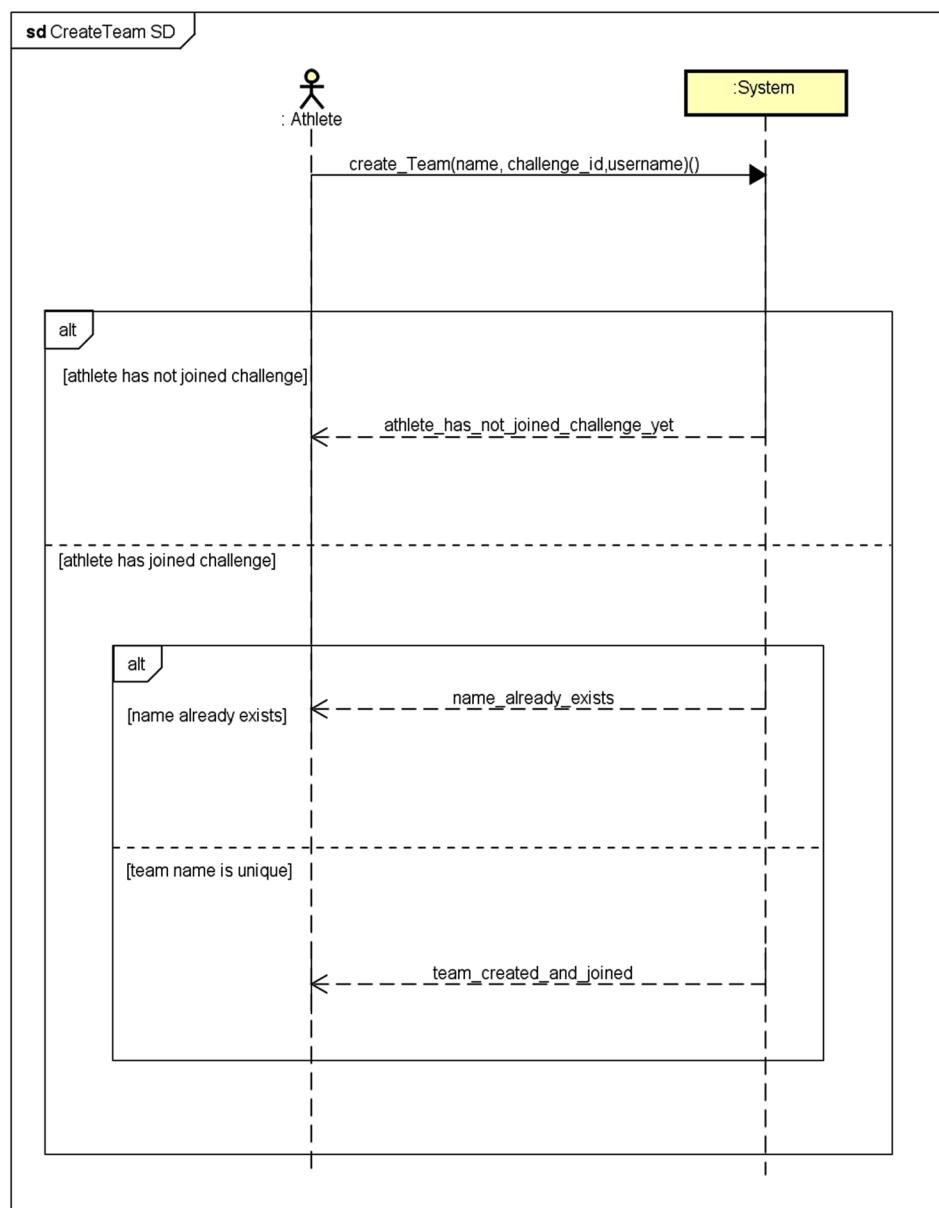
## *Figure 1.* *Domain Class Model*



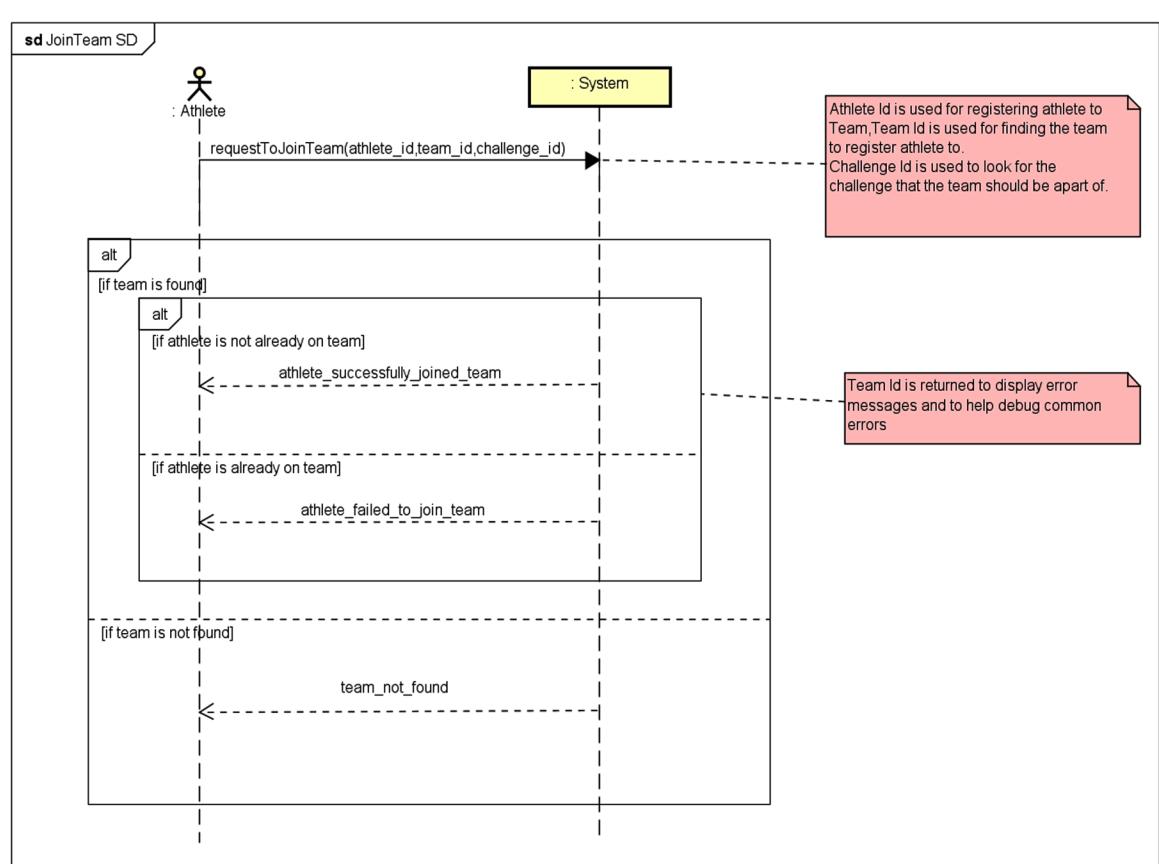
**Figure 2.**  
**Use Case Model**



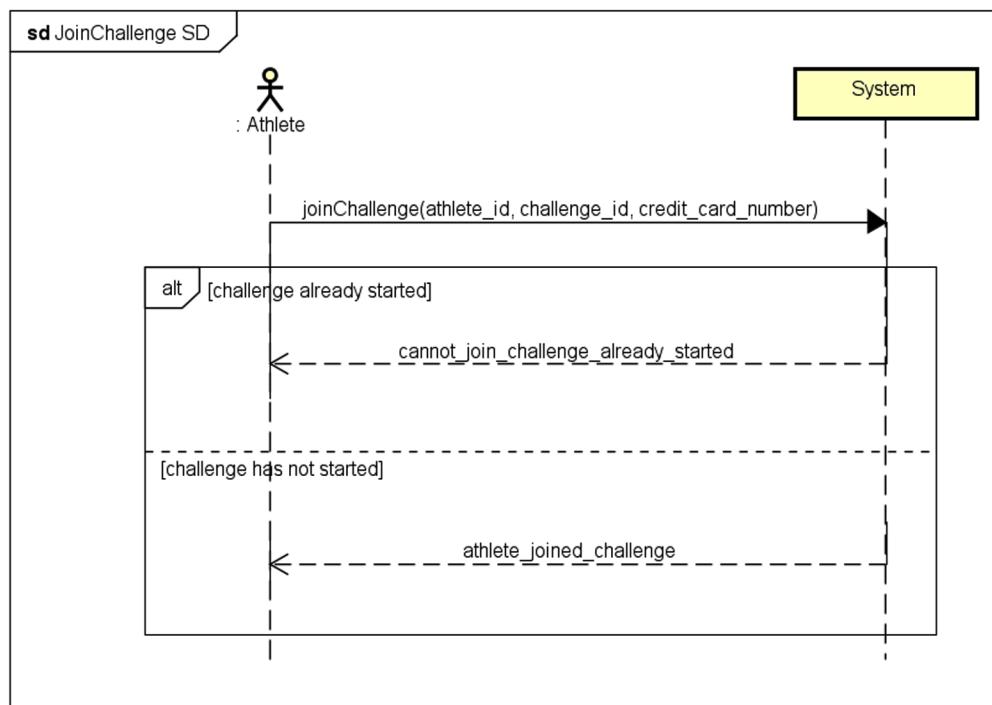
**Figure 3.**  
**Sequence Diagram for Create Team**



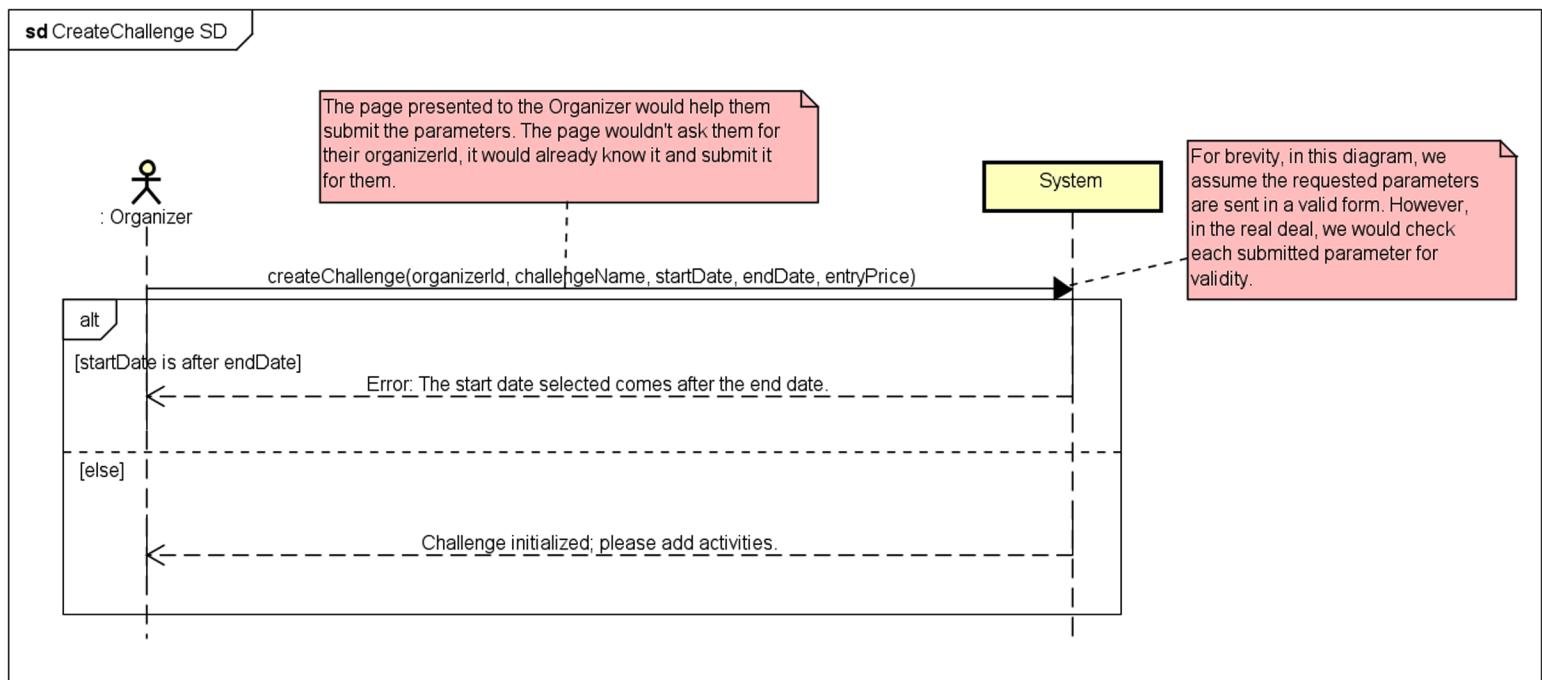
**Figure 4.**  
**Sequence Diagram for Join Team**



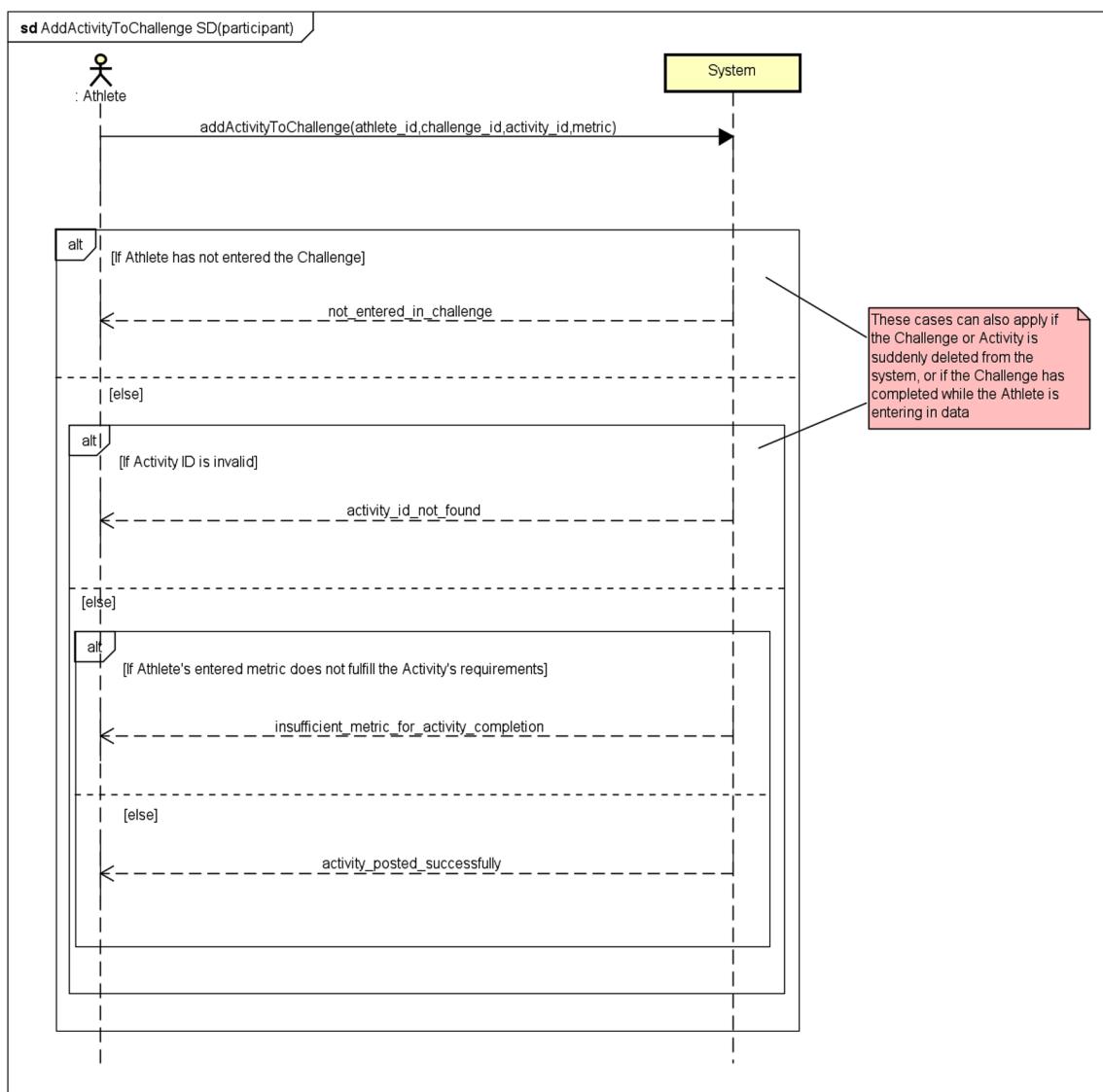
**Figure 5.**  
**Sequence Diagram for Join Challenge**



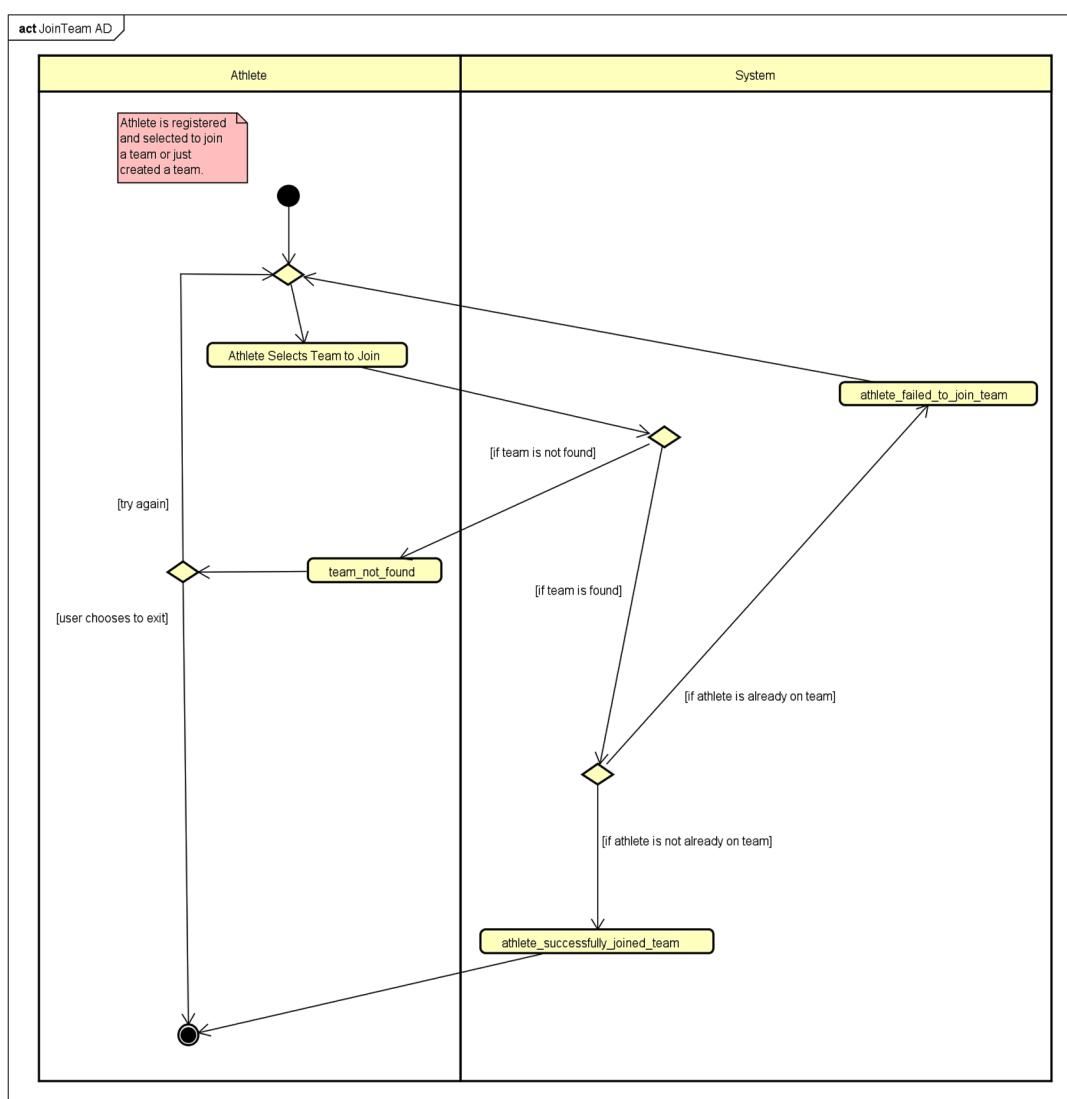
**Figure 6.**  
**Sequence Diagram for Create Challenge**



**Figure 7.**  
**Sequence Diagram for Add Activity to Challenge**

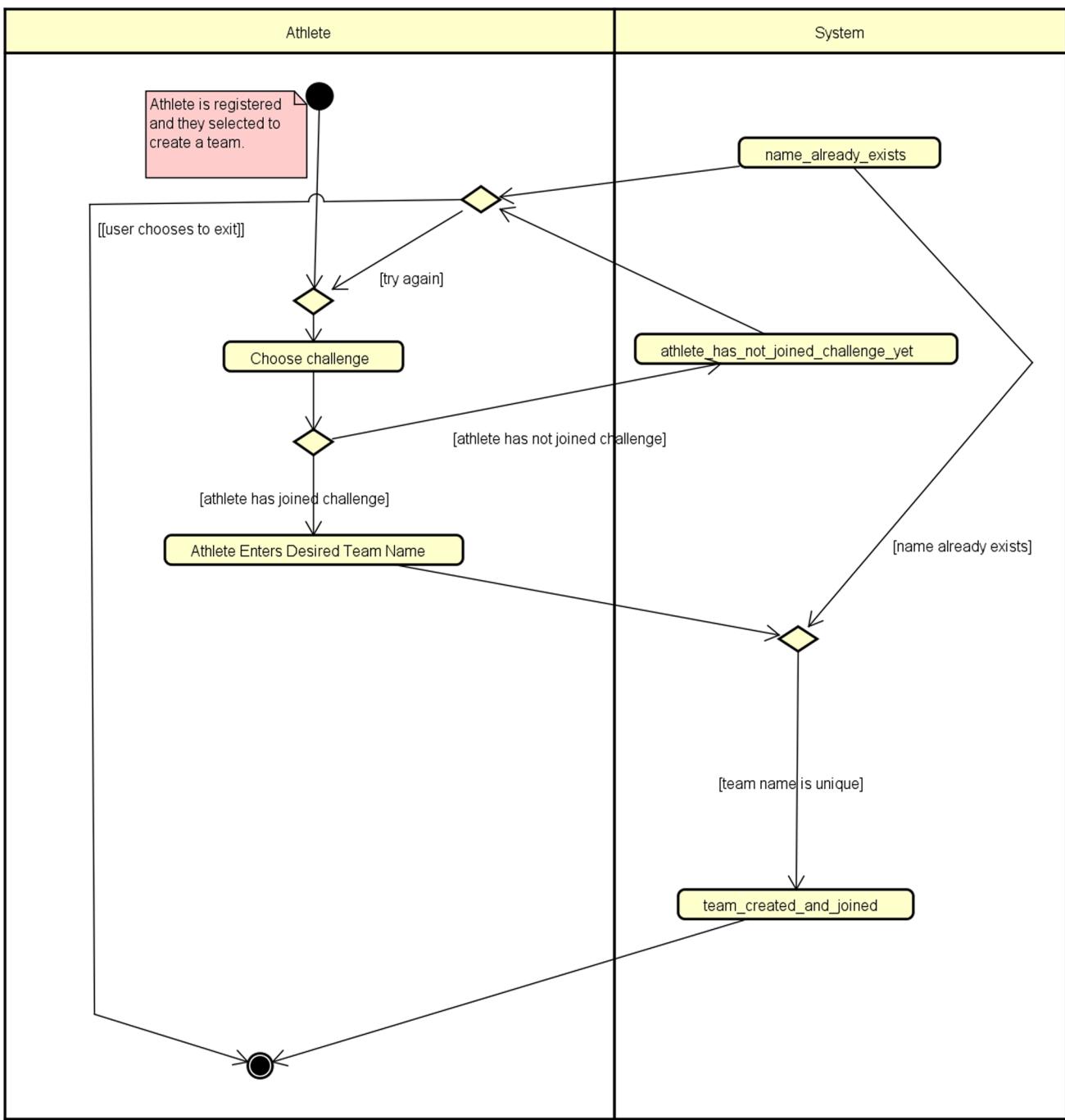


**Figure 8.**  
**Activity Diagram for Join Team**

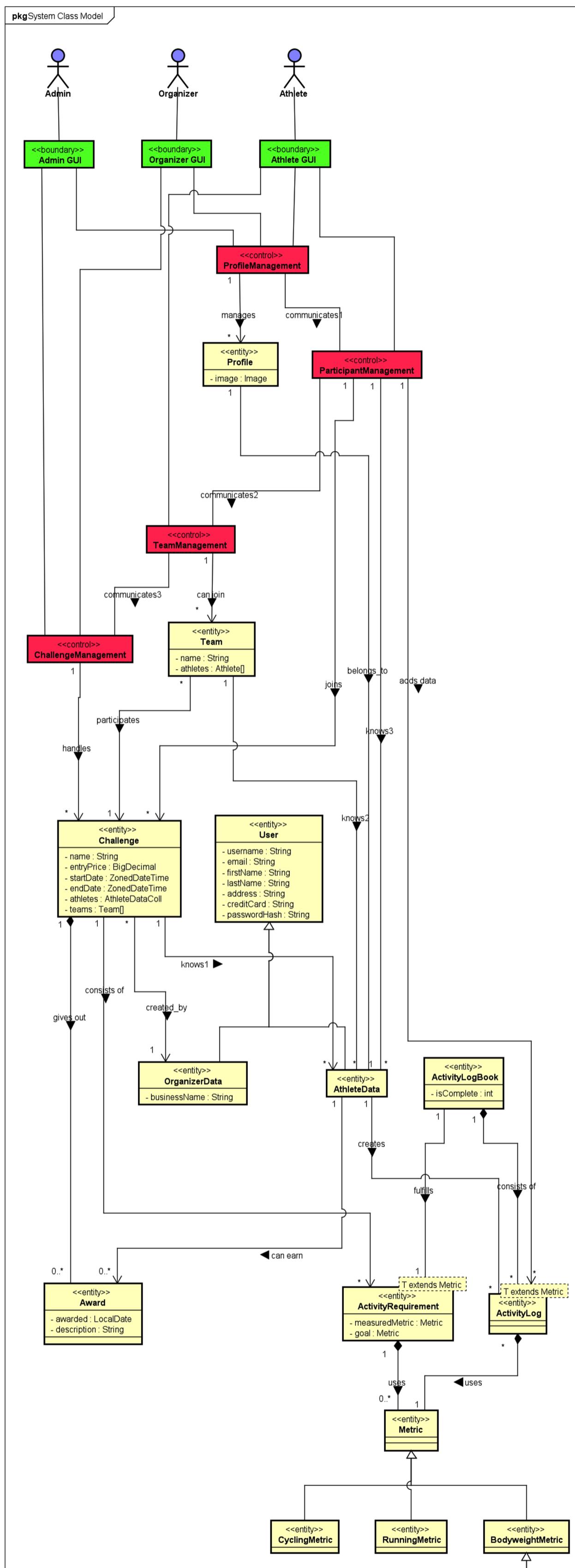


**Figure 9.**  
**Activity Diagram for Create Team**

act CreateTeam AD



**Figure 10.**  
**System Class Model**



**Figure 11.**  
**Operation Pattern for Join Team**

---

Name = Join Team  
 Description = User wishes to join a team that is participating in a challenge.  
 Assumptions: User, Team, Challenge all already exist.

---

Input = athlete\_id: Long, team\_id: Long, challenge\_id: Long  
 Reads = pm:Participant Management, tm: Team Management, cm:Challenge Management, a: athlete with a.id=athlete\_id, c: challenge with c.id=challenge\_id, t:team with t.id=team\_id, participates  
 Changes = knows2  
 Sends = Athlete: {athlete joined team\_id, athlete failed to join team\_id, team was not found team\_id}  
 Pre = Implicit  
 Post = LET  

$$\begin{aligned} \text{team\_not\_found} &== \forall t:team | t.id \neq \text{team\_id} \\ \text{athlete is already on team} &== \\ \exists a:Athlete | a.id &= \text{athlete\_id} \wedge \exists t:Team | t.id = \text{team\_id} \bullet (a,t) \in \text{knows2} \\ \bullet \\ (\text{team\_not\_found} &=> \\ &\text{is\_sent}\{\text{team not found team.id}\} \wedge \\ &\text{no\_effect} \wedge \\ (\neg\text{team\_not\_found} &=> \\ &\wedge (\text{athlete is already on team} == \\ &\text{is\_sent}\{\text{athlete failed to join team}\} \wedge \\ &\text{no\_effect} \wedge \\ &(\neg\text{athlete is already on team} == \\ &\text{knows2}' = \text{knows2} \cup \{(athlete,team)\} \wedge \text{is\_sent}\{\text{athlete joined team team\_id}\} \wedge \text{no\_effect})) \end{aligned}$$

**Figure 12.**  
**Operation Pattern for Create Challenge**

---

Operation = createChallenge

Description = Organizer creates a challenge which gets added to the system. Assumptions:  
 Organizer exists, all inputs exist and are in the correct format.

---

Input = organizerId: Identifiable, challengeName: String, startDate: ZonedDateTime,  
 endDate: ZonedDateTime, entryPrice: BigDecimal

Reads = cm: ChallengeManagement,

o: OrganizerData with o.Id = organizerId

Changes = Challenge, challenge\_new: Challenge type, created\_by, handles

Sends = Organizer {Error: The start date selected comes after the end date.,  
*Challenge initialized; please add activities.*}

Pre = implicit

Post = LET

Start\_after\_end == startDate > endDate

•

(Start\_after\_end =>

is\_sent{Error: The start date selected comes after the end date \wedge  
 no\_effect} \wedge

(\neg Start\_after\_end =>

is\_sent{Challenge initialized; please add activities.} \wedge

challenge\_new new \wedge

handles' = handles \cup {(cm, challenge\_new)} \wedge

created\_by' = created\_by \cup {(challenge\_new, o)})

***Figure 13.***  
***Operation Pattern for Create Team***

---

Operation = create\_Team

Description = Participants can create teams within challenges for other participants of the challenge to join. Assumptions: Athlete exists and is registered for challenge

---

Input = name : String, challenge\_id : Long, username : String

Reads = pm : ParticipantManagement, tm : TeamManagement  
 a : Athlete **with** a.username = username  
 c: Challenge **with** c.id = challenge\_id  
 t : Team **with** t.id = team\_id

Changes = can join, participates

Sends = Athlete : {athlete\_has\_not\_joined\_challenge\_yet, team\_created\_and\_joined}

Pre = Implicit

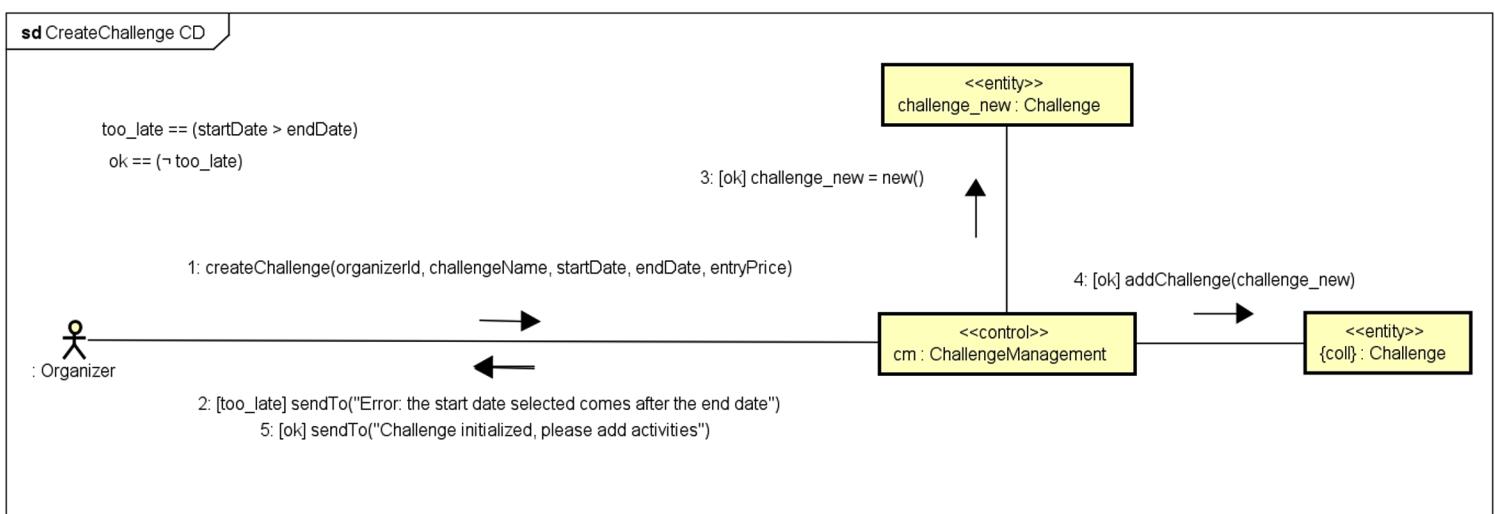
Post = LET

name\_already\_exists =  $\exists t : \text{Team} \bullet t.name = \text{name} \wedge (t, c) \in \text{Participates}$

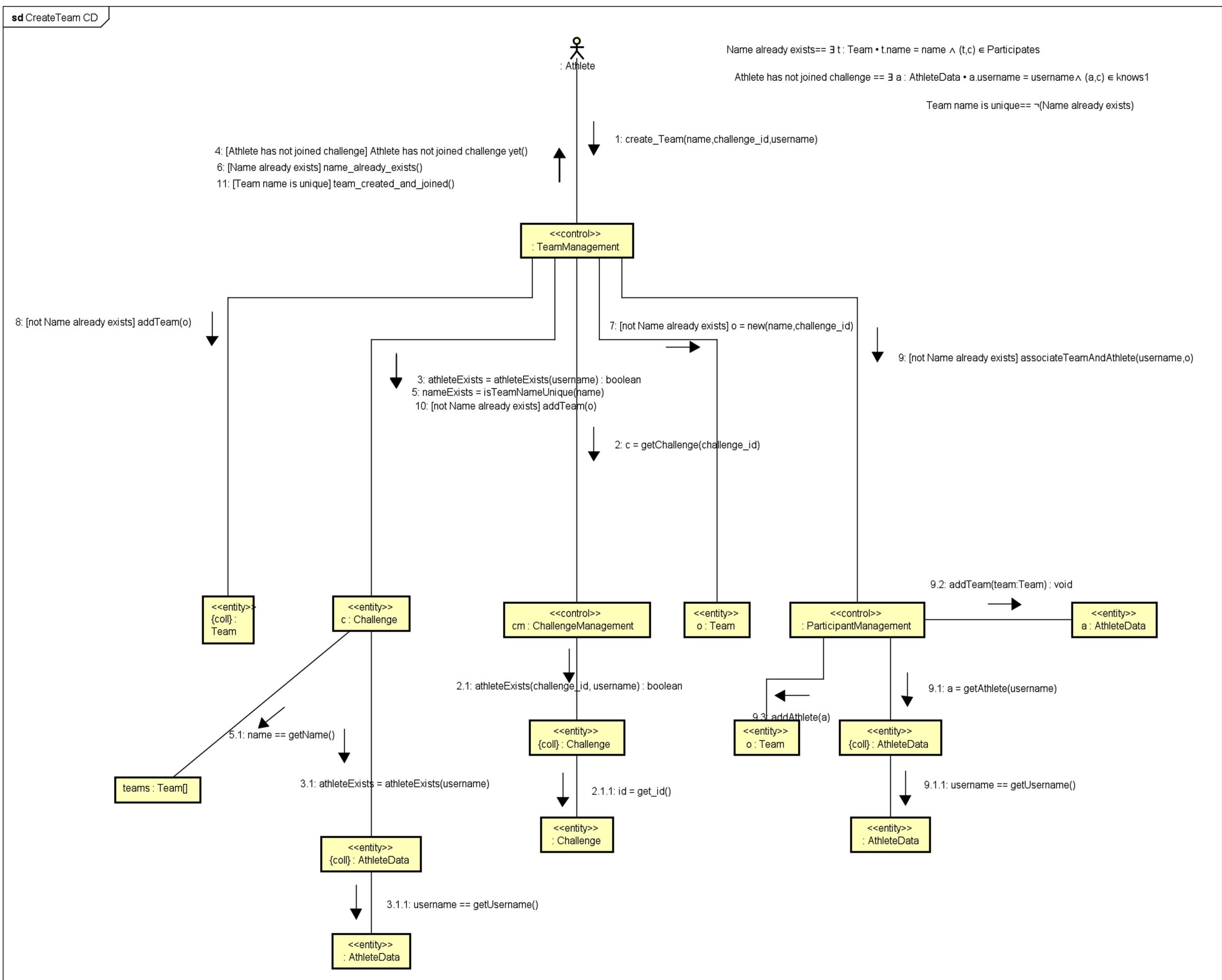
- $(\text{name\_already\_exists} \Rightarrow \text{is\_sent}\{\text{name\_already\_exists}\} \wedge \text{no\_effect}) \wedge (\text{athlete can join team} \Rightarrow \text{is\_sent}\{\text{join\_team}\} \wedge \text{can join}' = \text{can join} \cup \{(a, t)\} \wedge \text{no\_effect}) \wedge (\neg \text{name\_already\_exists} \Rightarrow \text{participates}' = \text{participates} \cup (t, c) \wedge \text{is\_sent}\{\text{team created}\} \wedge \text{no\_effect})$

***Figure 14.***  
***Communication Diagram for Create Challenge***

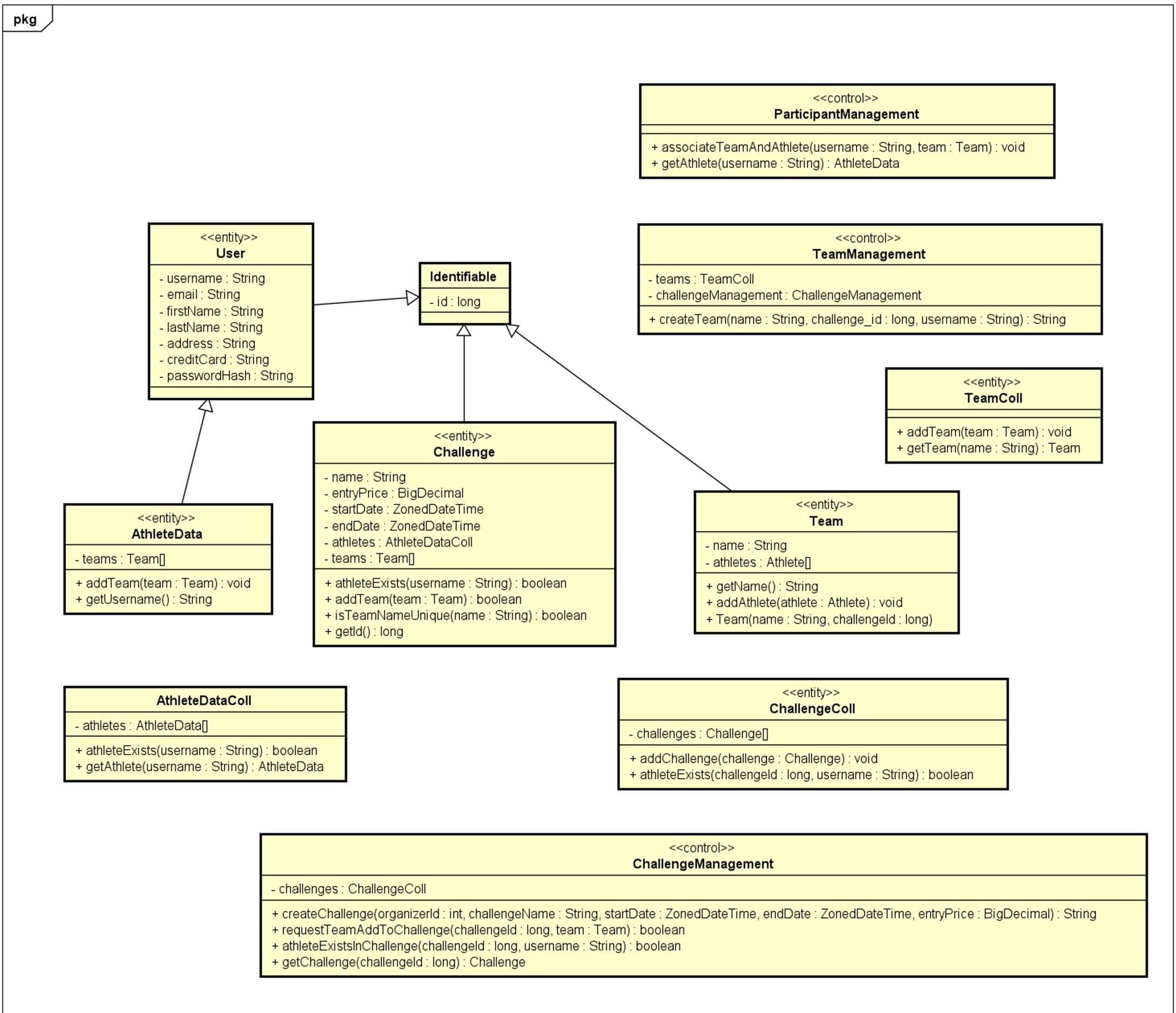
---



**Figure 15.**  
**Communication Diagram for Create Team**



**Figure 16.**  
**Implementation Class Model**



**Embedded Document:**  
**Personas**

**Separately Submitted Document on Canvas:**  
**UI Design**

## Persona: Athlete

*Magnus H. Beefcrunch*



Figure 1: Image Credit: Rachel Corey

Magnus is a 26-year-old Haskell developer for a medium-sized tech firm. He is very into fitness, especially lifting weights, and his perseverance and dedication has led to some impressive results. However, during his workout regimen, he routinely skips cardio and leg day, and is disappointed in his stamina compared to his gym peers.

Magnus's goals are to:

- Achieve a more well-rounded physique through lots of cardio
- Compete against others; Magnus is confident that his determination that gave him such rippling muscles can give him an advantage over casual athletes all over the world
- Group up with his gym buddies to keep himself accountable
- Encourage his gym buddies to be the best they can be!

Magnus's frustrations are:

- The monotony of cardio exercise; he'd like some sort of goal to keep himself motivated while he's bored and thinking of giving up
- Not having an immediate sense of outside validation to keep himself going; Magnus enjoys logging his exercises as soon as he completes them, to observe a concrete sense of progress towards his goals
- To follow up with the previous goal, Magnus is also frustrated when an app is difficult, clunky or slow to use; he wants to log his progress and move on to his next goal right away

## Persona: Organizer

*Odilia Obureau*



Figure 2: Image Credit: Rachel Corey

Odilia is a 34-year-old business relations manager for the multinational company *Argus Holdings Sons & Co Conglomerate, Incorporated*. She was able to work exceptionally hard from being hired at a young age at the giant company, eventually working her way up due to her skills at cutting costs for the firm, sometimes saving the business millions of dollars per fiscal year. Odilia's latest project she's using to rise through the ranks is negotiating down health insurance premiums for the employees' health benefits; the health insurance company has agreed to cut the price of insurance if she gets a certain number of employees to sign up for an athletic challenge on some sort of fitness platform.

Odilia's goals are:

- Get at least 300 employees to sign up for at least one athletic challenge
- Make the challenges she creates as easy as possible to sign up for, to avoid as little frustration from potential participants as possible
- Be able to easily monitor and report the progress of her employee badgering by seeing how many employees have signed up for which challenges

Odilia's frustrations are:

- Apps that are difficult for the average person to use; if it's difficult to sign up for the challenge, she won't make her primary goal of cutting costs for the company
- Apps that have a shady or bad reputation; if her employees don't like the look of the branding, they may not want to waste their time on something that seems cheap or shoddy
- A lack of any sort of easy-to-manage reward system to entice her employees to sign up for a challenge; Odilia wants the ability to manage rewards for challenges on the platform itself, not to manage it herself through messy spreadsheets

## Persona: Admin

*Ivy Lacerta*



*Figure 3: Image Credit: Rachel Corey*

Ivy is a 54-year-old woman who is technically retired; she used to own a reptile supply store, but these days, keeping up with the complications of retail management proved too much for her. So, to keep herself busy, she's decided to accept a part-time remote job as a platform administrator. She has a strong sense of justice and keeping the internet spaces she moderates drama-, spam-, and hate-free. She is interested in mobile gaming, Bible study, and, of course, reptiles.

Ivy's goals are:

- Moderate online platforms fairly and justly, keeping in mind the interests of all parties involved
- Make sure her fellow moderators are also adhering to the rules of the platform; she wants to ensure that her coworkers are professionally presenting the best image of the brand possible
- Respond to all emails, complaints, disputes and approvals in a timely manner
- Keep her lizards happy and healthy

Ivy's frustrations are:

- Not being able to see timestamped actions that a fellow moderator has taken on an account or platform object (User, Challenge, Organizer, Team, etc.) in the past; she also likes when her supervisors can see that she's not just slacking off at home, but that she's working hard at making the platform the best it can be
- Poorly defined moderation rules
- Complicated moderation/administration systems (Ivy is good with technology for someone her age, but it still takes her a little while to learn a new system)