

Task 3

1. $sc_bday \leftarrow \exists birth_date (\ O_{firstName = 'Sidney' \wedge lastName = 'Crosby'} (PlayerInfo))$

* assuming only one player w/ that name.

* We can further restrict this by specifying his team because he's never leaving the Penguins

2. $num_teams \leftarrow G_{count(teamID)} (TeamInfo)$

3. $num_nations \leftarrow G_{count-distinct(nationality)} (PlayerInfo)$

4. $num_can \leftarrow \frac{|\ O_{nationality = 'Canada'} (PlayerInfo) |}{| PlayerInfo |}$

5. $num_dec \leftarrow \frac{|\ O_{month(birthDate) = 12} (PlayerInfo) |}{| PlayerInfo |}$

6. rough work - - - - -

i (i) active players ingame = All Players in frame - Game scratches

i (ii) all games 2008-2009 2018-2019 = $O_{season = 2008-2009 \vee season = 2018-2019} (Game)$

* $\exists game.awayTeamID, game.homeTeamID$ but don't team change over time? trades and such? OH but if a player isn't on a team in the games we care about we don't need to show them. wait no this is still a problem

I assume static teams!

$P_{Game1} (O_{season = 2008-2009 \vee season = 2018-2019} (Game)) \bowtie_{game.homeTeamID = TeamInfo.teamID} P_{Game2} (O_{season = 2008-2009 \vee season = 2018-2019} (Game)) \bowtie_{game2.awayTeamID = TeamInfo.teamID}$

can I reuse this var? let's assume so.

we can simplify & join on Players via teamID, again assuming "static teams"

wait PlayerInfo doesn't have a team ID 61

* Can we assume GamePlayPlayers captures everyone on the ice? I don't think so...? But I think we have to.

AllPlayers $\leftarrow \left(\begin{array}{l} \text{O}_{\text{Season} = 20082009 \vee \text{Season} = 20182019} (\text{Game}) \bowtie_{\text{gameID}} \text{Game Plays Players} \\ \text{(active)} \end{array} \right)$

final answer:

$\sum_{\text{Count-Distinct}(\text{playerID})} \left(\begin{array}{l} \text{O}_{\text{Season} = 20082009 \vee \text{Season} = 20182019} (\text{Game}) \bowtie_{\text{gameID}} \text{Game Plays Players} \end{array} \right)$

7.

maxPen $\leftarrow \sum_{\text{Max}(\text{numpenalties})} \left(\begin{array}{l} \text{gameID} \sum_{P_{\text{numpenalties}}} (\text{Count}(\text{GamePenalties}, \text{gameID})) (\text{Game Plays} \bowtie_{\text{playID}} \text{Game Penalties}) \end{array} \right)$

teams $\leftarrow \left(\begin{array}{l} \text{TeamInfo.teamID} = \text{maxPen.teamIDfor} \vee \text{TeamInfo.teamID} = \text{maxPen.teamIDagainst} \\ \text{P}_{\text{maxPen}} \left(\begin{array}{l} \text{numpenalties} = \sum_{\text{Max}(\text{numpenalties})} \left(\begin{array}{l} \text{gameID} \sum_{P_{\text{numpenalties}}} (\text{Count}(\text{GamePenalties}, \text{gameID})) (\text{Game Plays} \bowtie_{\text{playID}} \text{Game Penalties}) \end{array} \right) \end{array} \right) \end{array} \right)$

8.

$$m_{xpn} \leftarrow \max(pnct) \quad ($$

$$\underset{\text{gameID}}{\sum} P_{pnct \text{ count}}(\text{play ID}) \quad ($$

$$P_{GPS} \left(\underset{\text{GameSeason = 20182019}}{\circ} \right) \left(\text{Games} \times \underset{\text{gameID}}{\sum} \text{Game Plays} \right) \times playID$$

Game Penalties

)

)

$$teams \leftarrow \prod_{\text{gameID}} \left(\underset{pnct = m_{xpn}}{\circ} \right) \quad ($$

$$\underset{\text{gameID}}{\sum} P_{pnct}(\text{count}(\text{play ID})) \quad ($$

$$P_{GPS} \left(\underset{\text{GameSeason = 20182019}}{\circ} \right) \left(\text{Games} \times \underset{\text{gameID}}{\sum} \text{Game Plays} \right) \times playID$$

Game Penalties

))

)

9. -- rough work - - - - - - - - - - - - - - - -
- get the max penalty person & keep removing them from set?
 - don't think there's a way to specify stop condition

- get all players who played in both szn,
- get all penalties by those players
- group by game? Also yes group by game and select

G_P - GamePlays (gameID, playID ...)

G_{Pn} - GamePenalty (playID, penalty, ...)

G_{PP} - GamePlayPlayers (playID, gameID, playerID, ...)

all players who were in plays '18'is , '19's

$$[\partial_{G_P \text{ season} = 1819 \vee G_P \text{ season} = 0819} (G_{PP} \bowtie_{\text{gameID}} G_P) \dots]$$



Join this with penalties! and select ones from 18, 19 szn

$$\dots \bowtie_{\text{playID}} G_{Pn}$$



then we can sum / group by?

$\text{playerID} \sum_{G_{Pn}} (\text{penalties})$ ← is this a thing? I'll assume it is. Also it should use multiset behaviour!

* breaking into multi-assignments since 1-liners are messy

$$(\partial_{G_P \text{ season} = 1819 \vee G_P \text{ season} = 0819} (P_{GPP} \text{ GamePlayPlayers} \bowtie_{\text{gameID}} P_{GP} \text{ GamePlays})) \bowtie_{\text{playID}} P_{G_{Pn}} \text{ GamePenalties}$$

$$\text{PlayerPenalties } 1819 \leftarrow \partial_{\text{season} = 1819} (\text{PlayerPenalties})$$

$$\text{PlayerPenMins} \leftarrow \Pi_{\text{playerID}, \text{pminsum}} \left(\text{playerID} \left(\sum_{\text{pminsum}} (\text{penaltyMinutes}) \right) \text{PlayerPenalties} \right)$$

$$\text{PenMinsLeaderID} \leftarrow \pi_{\text{playerID}} \left(\sigma_{pminsum = g_{\max(pminsum)}} \left(\text{PlayerPenMins} \right) \right)$$

$$\text{PenMinsLeader} \leftarrow \sigma_{\text{playerID} = \text{PenMinsLeaderID}} \left(\text{PlayerInfo} \right)$$

10.

PlayerPenalties \leftarrow

$$\left(\sigma_{GP.\text{season} = 1819 \vee GP.\text{season} = 0809} \left(\text{GamePlayPlayers} \bowtie_{\text{gameID}, GP} \text{GamePlays} \right) \right) \bowtie_{\text{playID}} \text{GamePenalties}$$

PlayerPenMinutes \leftarrow

$$\pi_{\text{playerID}, \text{season}, pminsum} \left(\text{playerID}, \text{season} \sum_{pminsum} GP_{\text{penaltyMinutes}} \left(\text{PlayerPenalties} \right) \right)$$

playerID	season	pminsum
:	i	:

Season C { 20182019, 20082009 }

PlayersMorePenMinutesIn1819 \leftarrow

* assume seasons can be compared as integers

$$\pi_{\text{playerID}, \text{pminsum}} \left(\sigma_{T.\text{season} < PPM.\text{season} \wedge T.pminsum < PPM.pminsum} \left(\begin{array}{l} P_T \text{ PlayerPenMinutes} \times P_{PPM} \text{ PlayerPenMinutes} \end{array} \right) \right)$$

numPlayersWithMorePenMinsIn1819than0809

\leftarrow | PlayersMorePenMinutesIn1819 |