Tiruo Yan-tiy24-4151983-Assignemt 2

Part1

a) Arity: 1, Cardinality: possible from 1 to 100
b) If each mail has at least one recipient, then Arity: 9, Cardinality: 2000 to 3500
c) Arity: 8, Cardinality: 2500

Part2

a) .

$$RSLT \leftarrow \Pi_{fname, lname, SenderID, subject, timeSent}(\sigma_{urgent=true}(Mail \bowtie_{mail.senderID=Users.UserID} USERS))$$

b) .

$$RSLT \leftarrow \Pi_{mail.senderID}(\sigma_{urgent=true \wedge \neg(country='USA')}(Mail \bowtie_{mail.senderID=Users.UserID} USERS))$$

c) .

$$NotUrg \leftarrow Labels * (\sigma_{urgent=false \wedge timeSent \geq 2015-01-01\ 00:00:00 \wedge timeSent < 2016-01-01\ 00:00:00} Mail)$$

$$RSLT \leftarrow \mathcal{F}_{count(MailIDs)}(\sigma_{label='important'} NotUrg)$$

d) .

$$GetAda \leftarrow \Pi_{userID}(\sigma_{fname='Ada' \wedge lname='lovelace'} Users)$$

$$AdaMsg \leftarrow GetAda \bowtie_{getAda.userID=Mail.senderID} Mail$$

$$AdaSent \leftarrow \Pi_{Recipients.recipientID}(AdaMsg * Recipients)$$

$$IDs \leftarrow (Mail * Recipients) \div AdaSent$$

$$RSLT \leftarrow \Pi_{fname, lname}(IDs \bowtie_{SenderID = UserID} Users)$$

e) .

$$inUSA \leftarrow \sigma_{Users.country = 'USA'}(Users)$$

$$sendUSA \leftarrow \Pi_{mailID}(Mail \bowtie_{Mail.SenderID = inUSA.UserID} inUSA)$$

$$recUSA \leftarrow \Pi_{mailID}(Recipients \bowtie_{Recipients.recipientID = inUSA.UserID} inUSA)$$

$$replys \leftarrow \Pi_{mailID}(\sigma_{\neg(replyTo = NULL)} Mail)$$

$$RSLT \leftarrow (sendUSA \cup recUSA) - replys$$