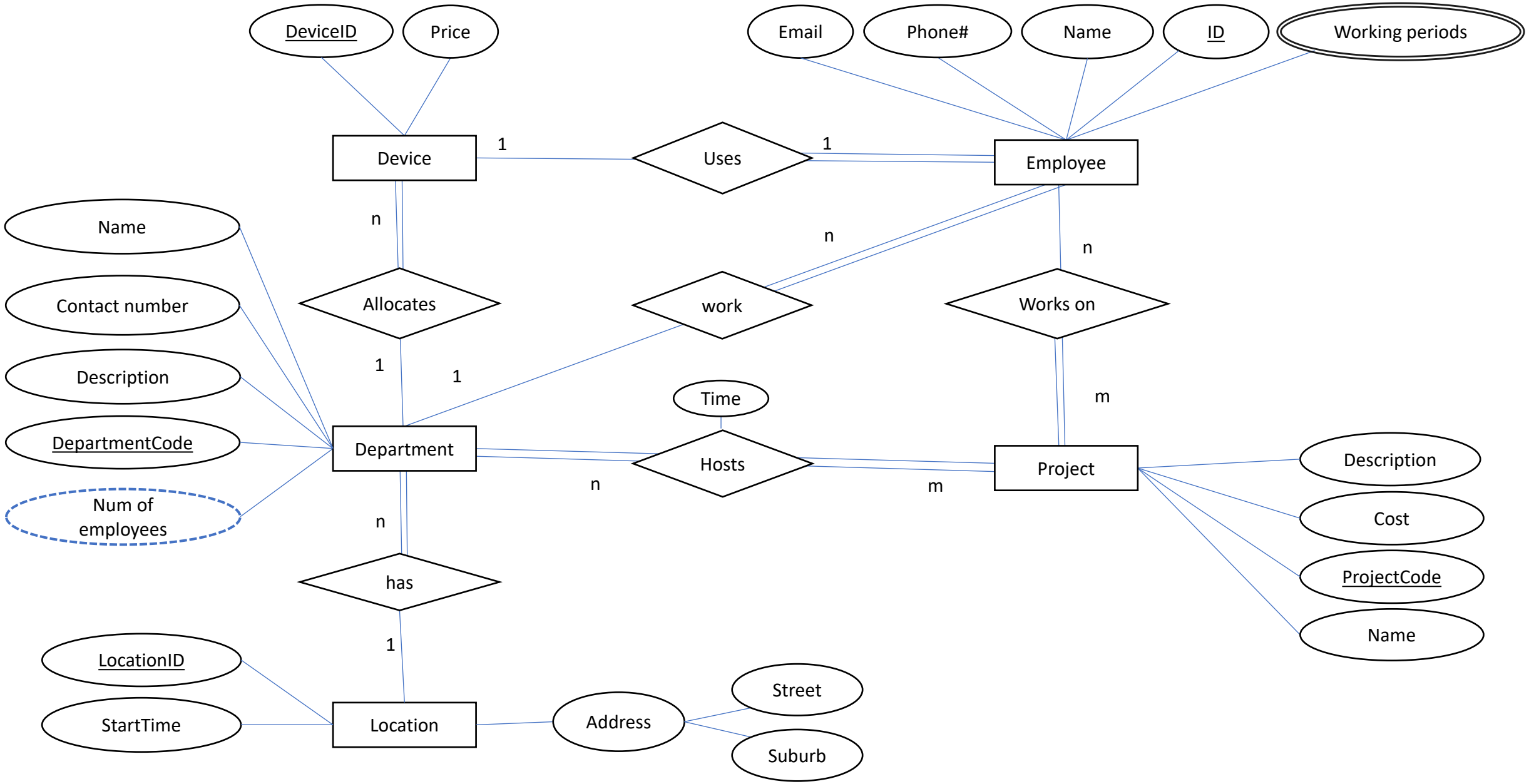
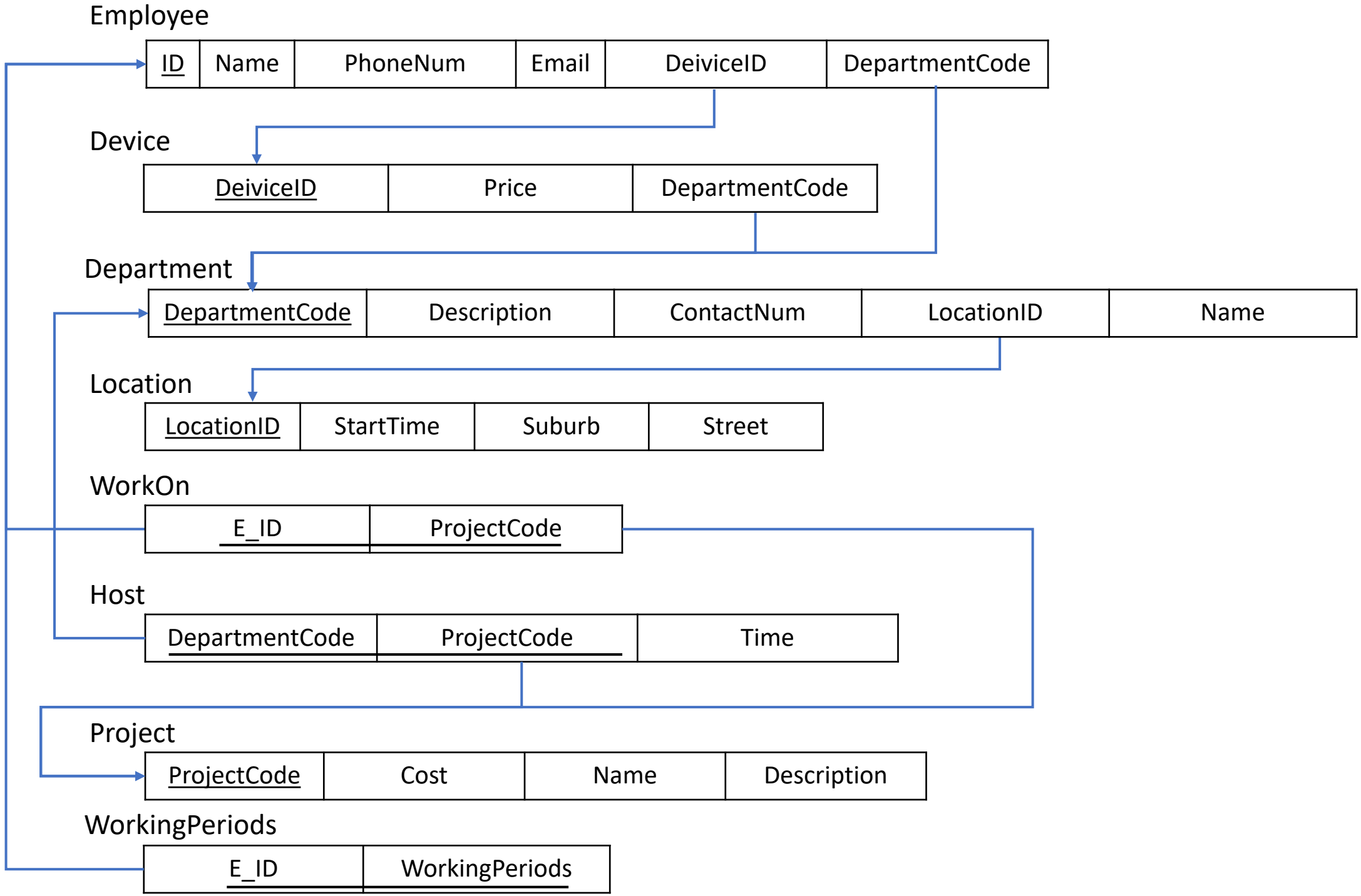


1. No penalty for ***Partial*** participation of *Department -> Project* (It's acceptable if you assume that a department hosts no projects.)
2. No penalty for ***Total*** participation of *Department -> Employee* (It's acceptable if you assume that each department has more than one employee.)


Employee
ID
Name
PhoneNum
Email
DeiviceID
DepartmentCode
Device
DeiviceID
Price
DepartmentCode
Department
DepartmentCode
Description
ContactNum
LocationID
Name
Location
LocationID
StartTime
Suburb
Street
WorkOn
E_ID
ProjectCode
Host
DepartmentCode
ProjectCode
Time
Project
ProjectCode
Cost
Name
Description
WorkingPeriods
E_ID
WorkingPeriods

1) Find the ***titles*** of the movies directed by ***James Cameron***. (2 marks)

$$\pi_{\{mTitle\}}(Movie \bowtie Direction \bowtie \sigma_{(Name=\text{“James Cameron”})} Director)$$

2) Find the ***names*** of the actors who have acted in at least ***4*** movies. (2 marks)

$$\pi_{\{aName\}}(\sigma_{(COUNT(mID) \geq 4)}(\gamma_{aID,\ aName,\ COUNT(mID)}(Actor \bowtie Cast)))$$

3) Find the ***titles*** of the cross-genre movies which are both ***comedy*** and ***drama***, but ***Jim Carrey*** is not in the cast list. (3 marks)

$$R_0 \leftarrow Movie \bowtie Genre \bowtie Cast \bowtie Actor$$
$$R_1 \leftarrow \pi_{\{mId,mTitle\}}(\sigma_{(genre=\text{“}\boldsymbol{comedy}\text{”})} R_0)$$
$$R_2 \leftarrow \pi_{\{mId,mTitle\}}(\sigma_{(genre=\text{“}\boldsymbol{drama}\text{”})} R_0)$$
$$R_3 \leftarrow \pi_{\{mId,mTitle\}}(\sigma_{(aName=\text{“}\boldsymbol{Jim\ Carrey}\text{”})} R_0)$$
$$R_4 \leftarrow \pi_{\{mTitle\}}(R_1 - (R_1 - R_2) - R_3)$$

4) Find the ***names*** of the ***female*** directors who only directed ***long movies*** (>=2hrs) but have never directed any movies with more than ***10*** actors. (3 marks)

$$R_0 \leftarrow Movie \bowtie Direction \bowtie Director$$
$$R_1 \leftarrow \pi_{\{dID,dName\}}(\sigma_{(time<120)} R_0)$$
$$R_2 \leftarrow \pi_{\{dID,dName\}}\left(\sigma_{(gender=\text{“}female\text{”})} R_0\right) - R_1$$
$$R_3 \leftarrow \pi_{\{mID\}}(\sigma_{(COUNT(aID)>10)}(\gamma_{mID,COUNT(aID)}\left(\pi_{\{mID,aID\}} Movie \bowtie Cast \bowtie Actor\right)))$$
$$R_4 \leftarrow \pi_{\{dName\}}(R_2 - \pi_{\{dID,dName\}}(R_3 \bowtie R_0))$$