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Database Systems

Concepts, Languages and Architectures

Paolo Atzeni • Stefano Ceri • Stefano Paraboschi • Riccardo Torlone

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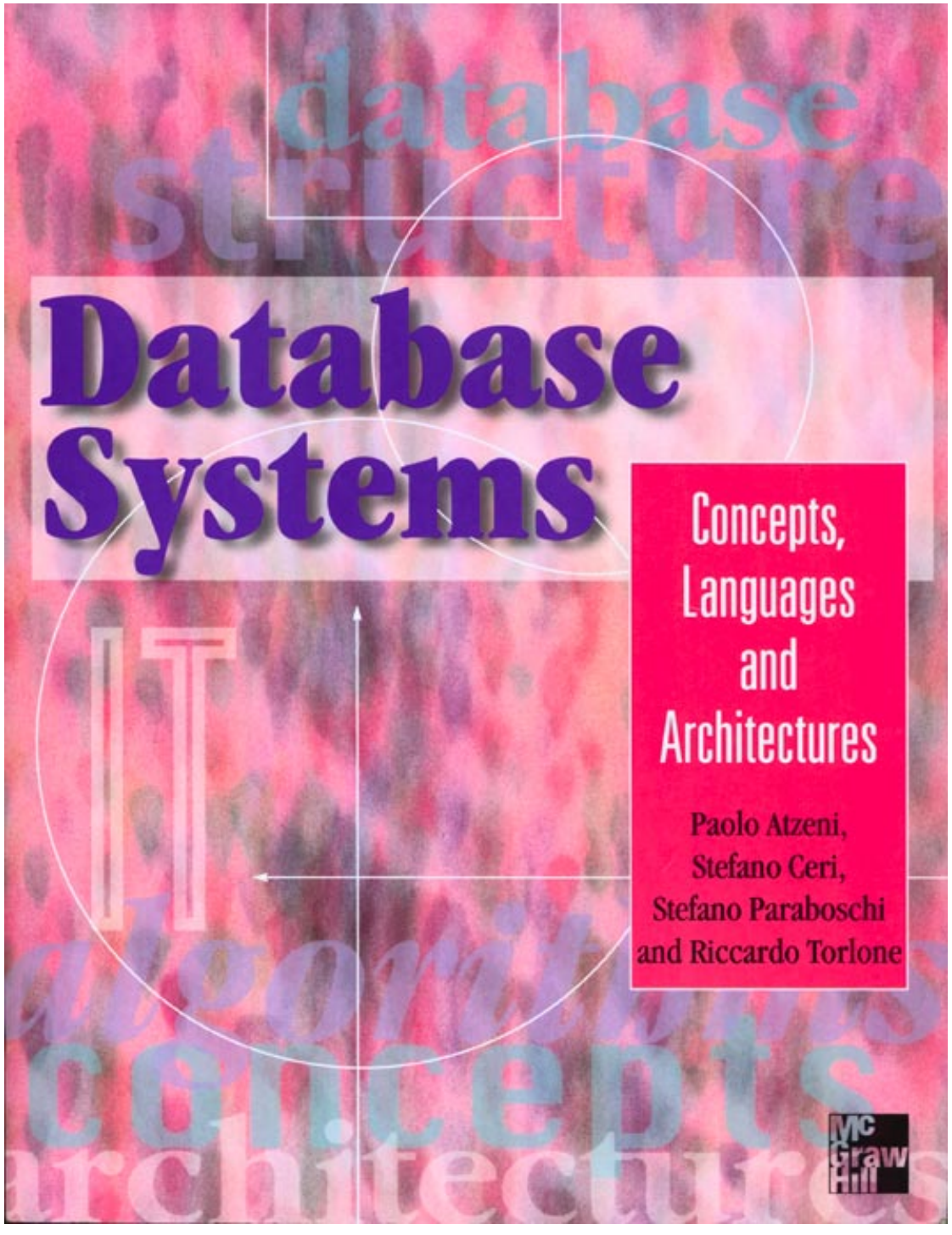
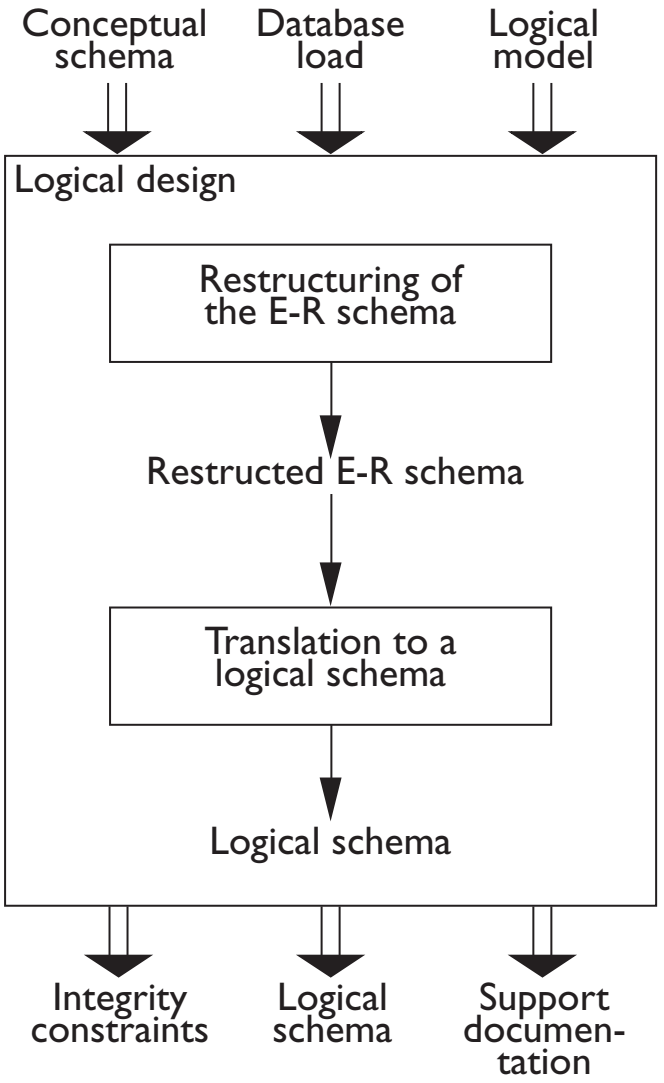


Chapter 7

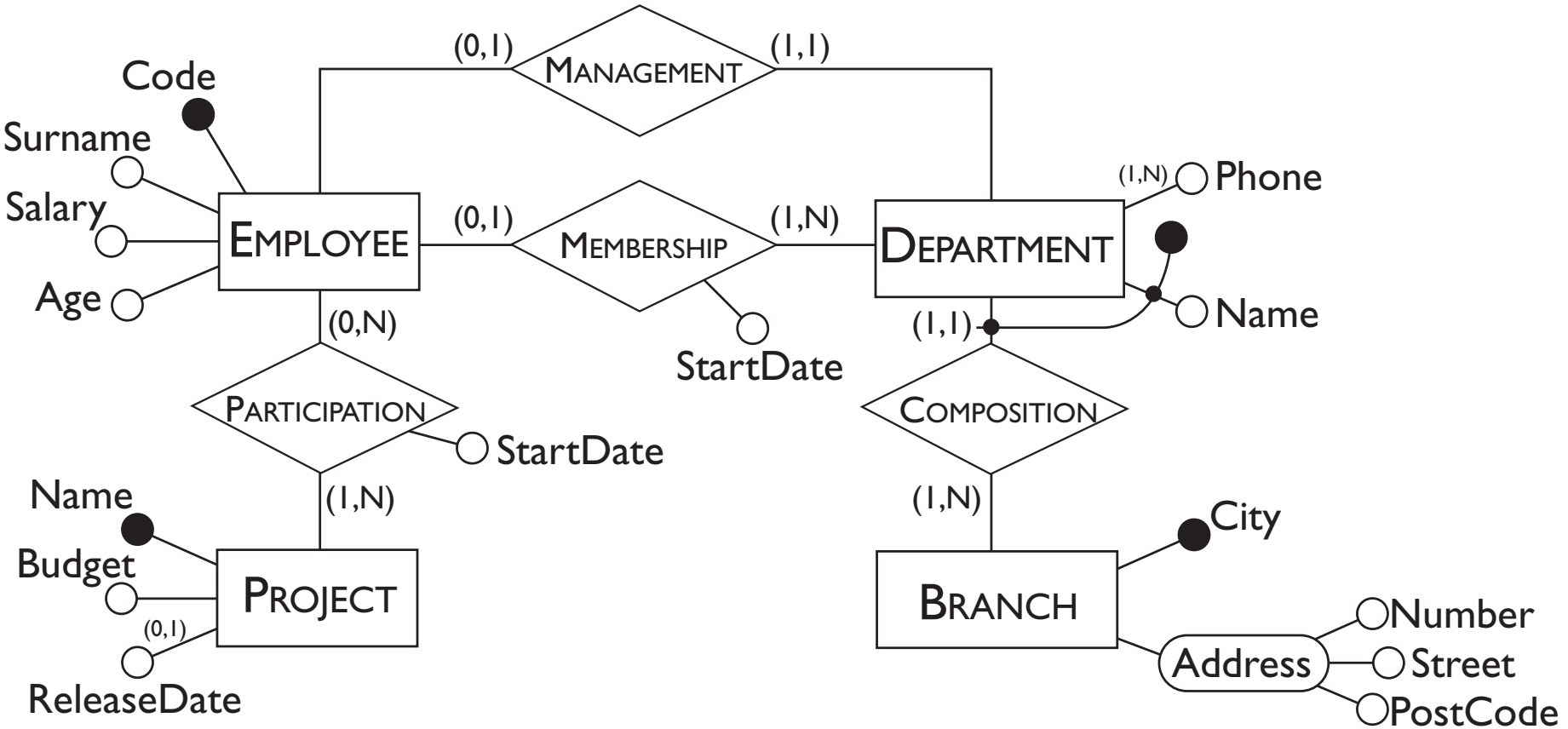
Logical design

Click here for help

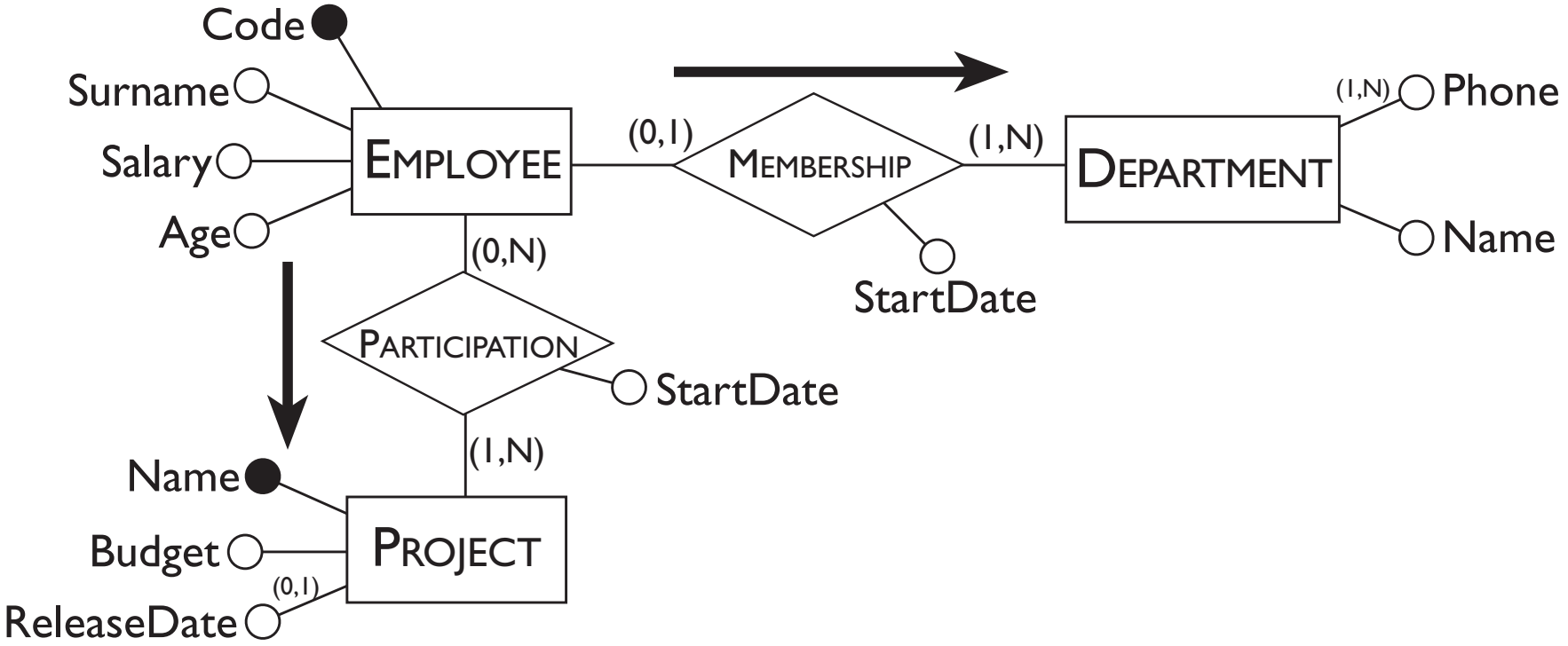
Logical database design



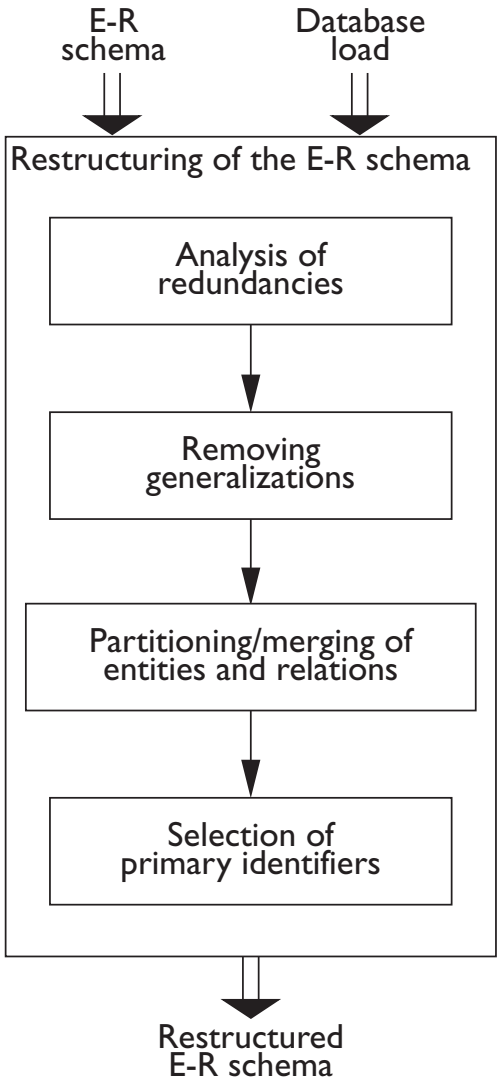
An E-R schema on the personnel of a company



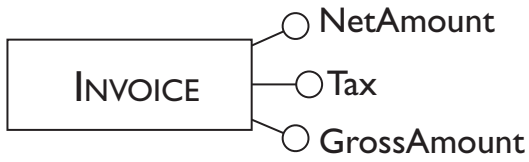
Example of a navigation schema

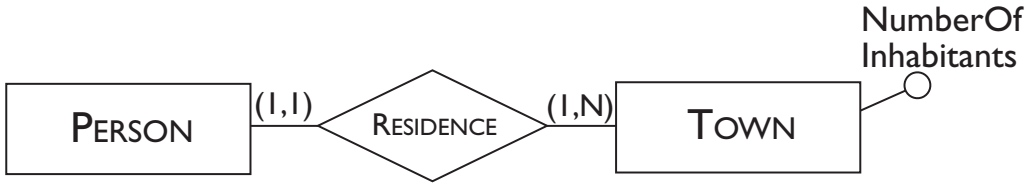


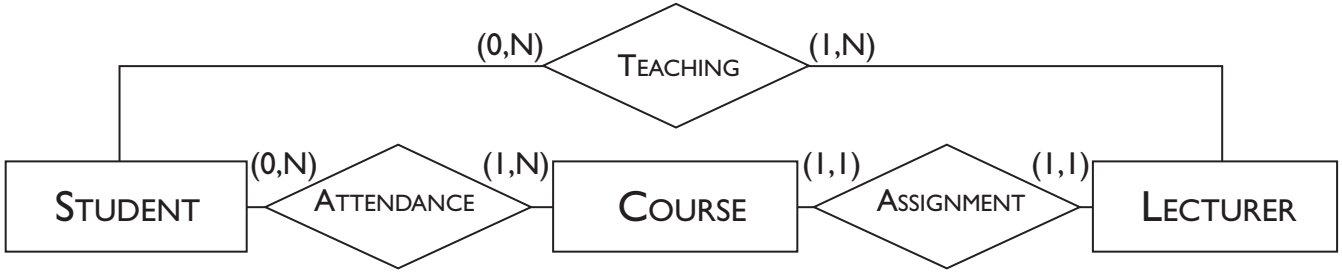
Restructuring tasks of an E-R schema



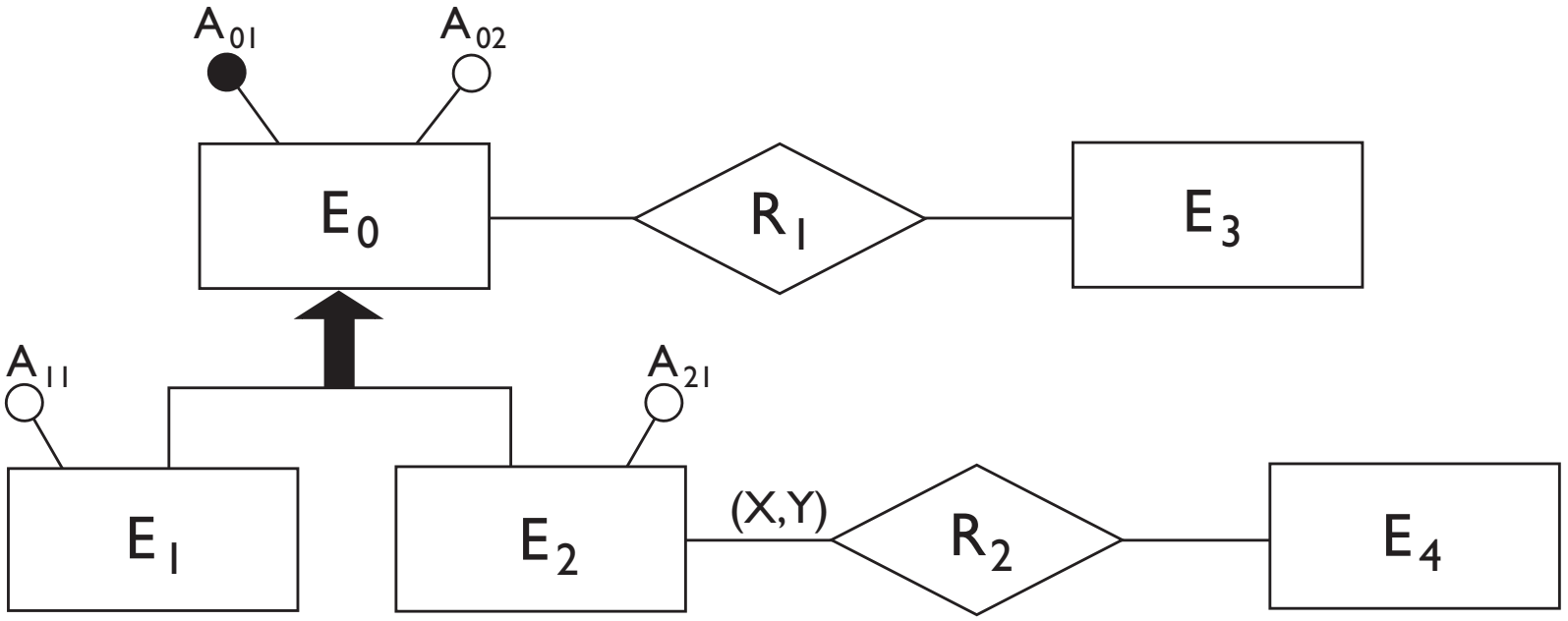
Examples of schemas with redundancies



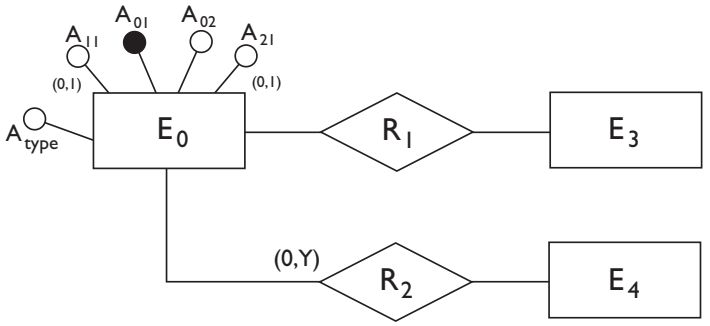


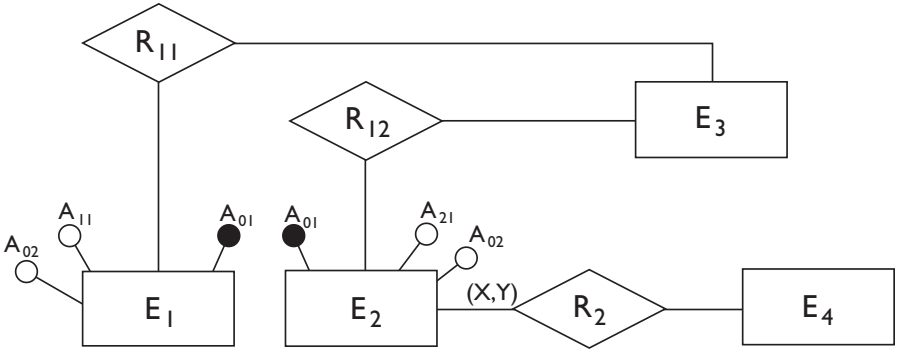


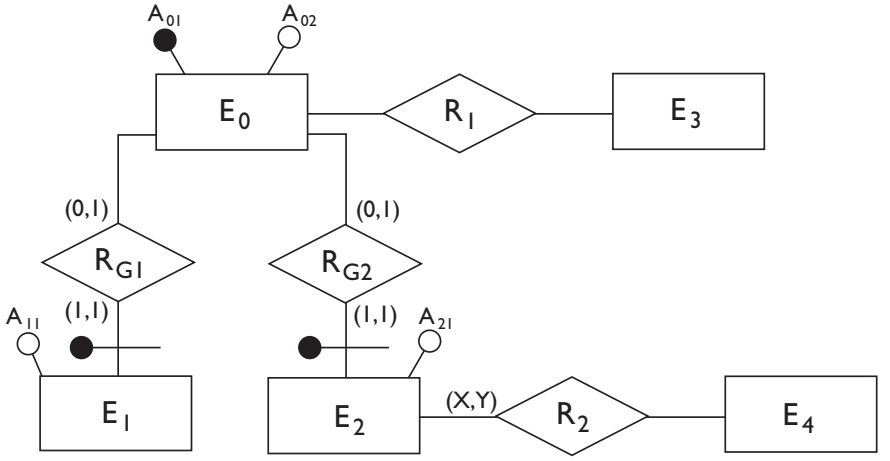
Example of a schema with generalization



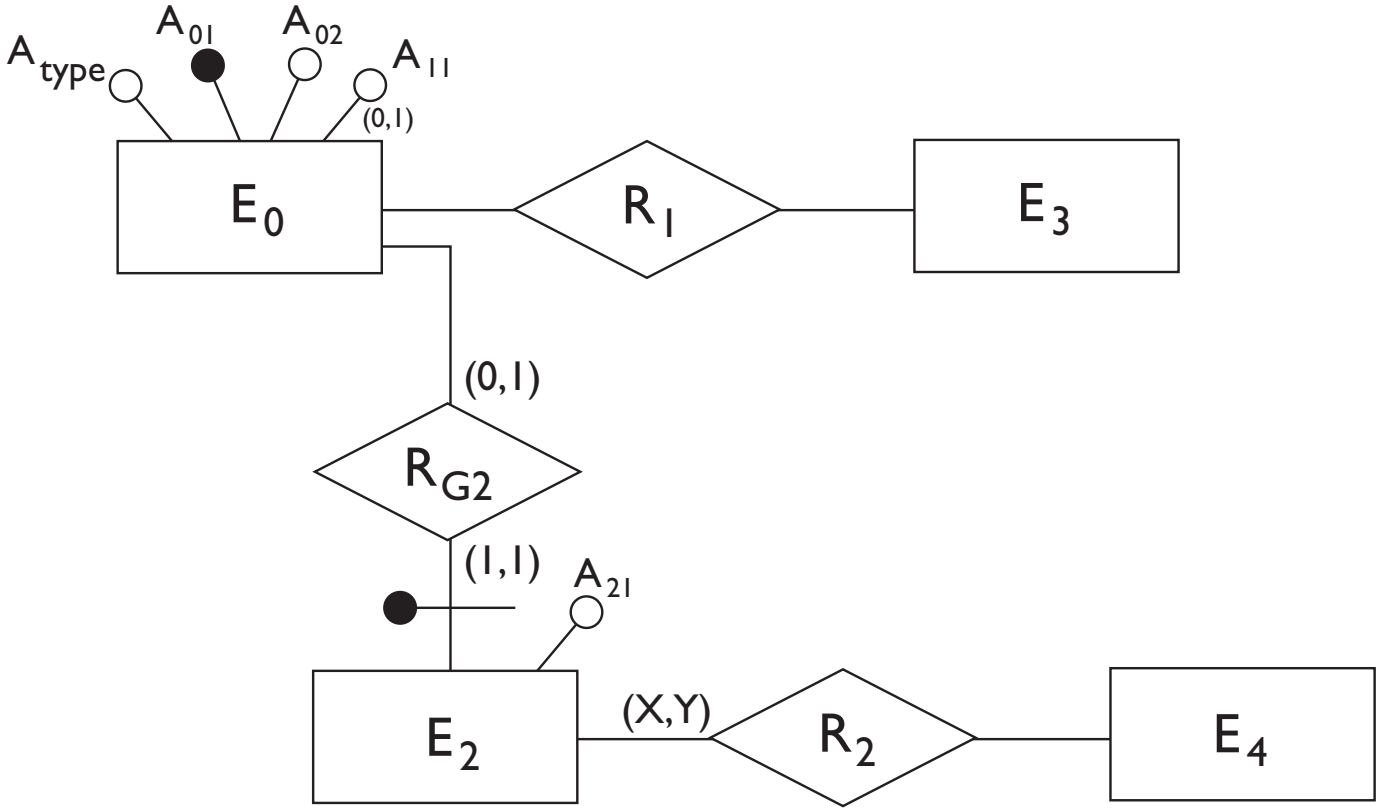
Possible restructurings of the previous schema



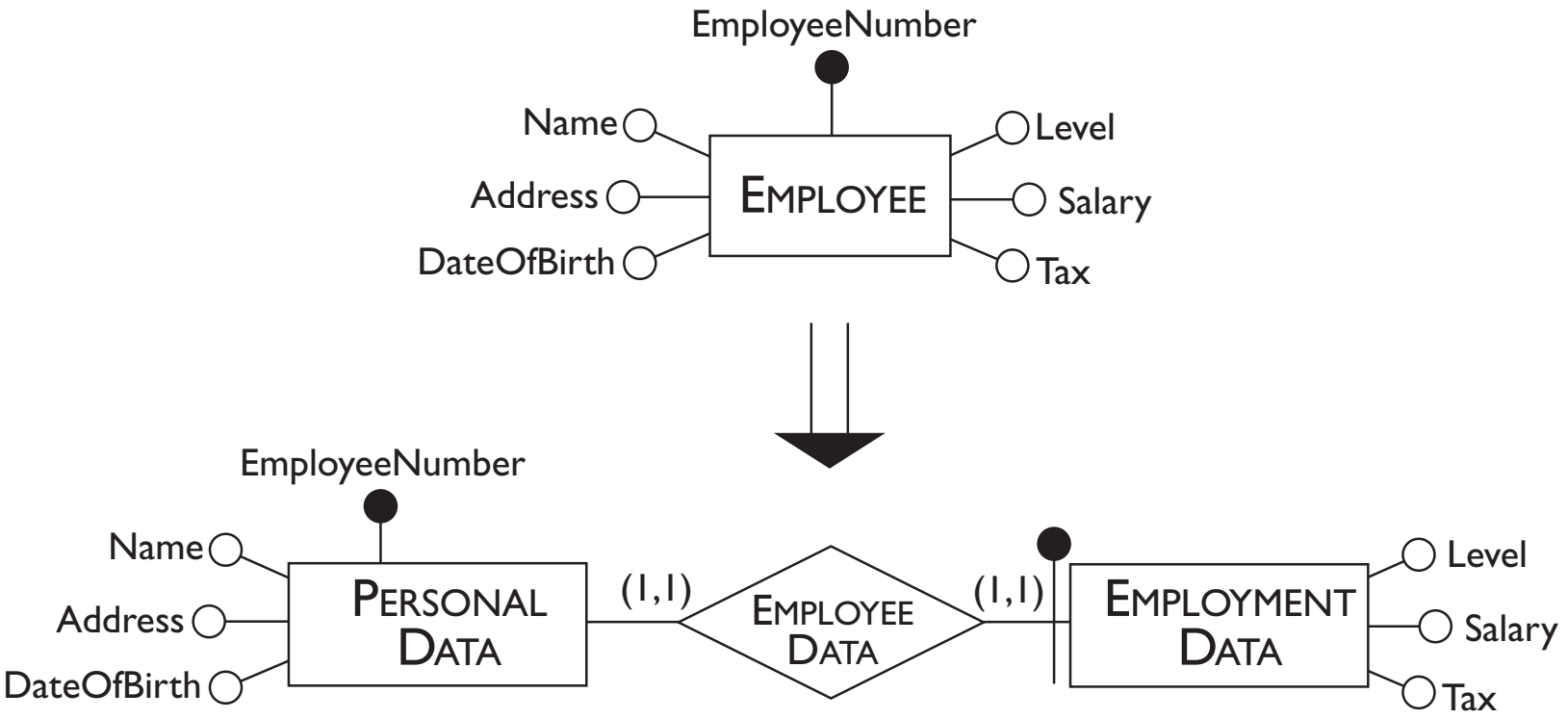




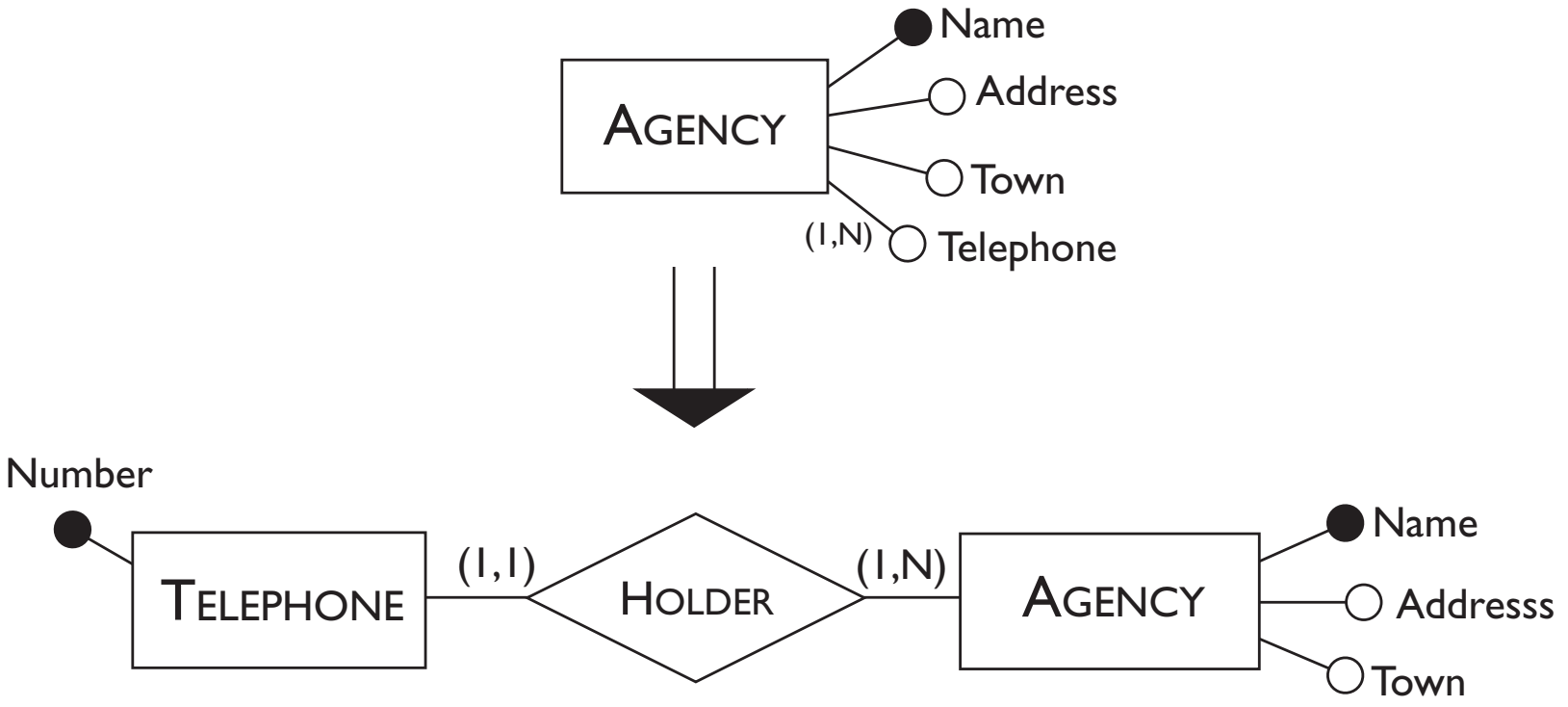
Possible restructuring of the previous schema



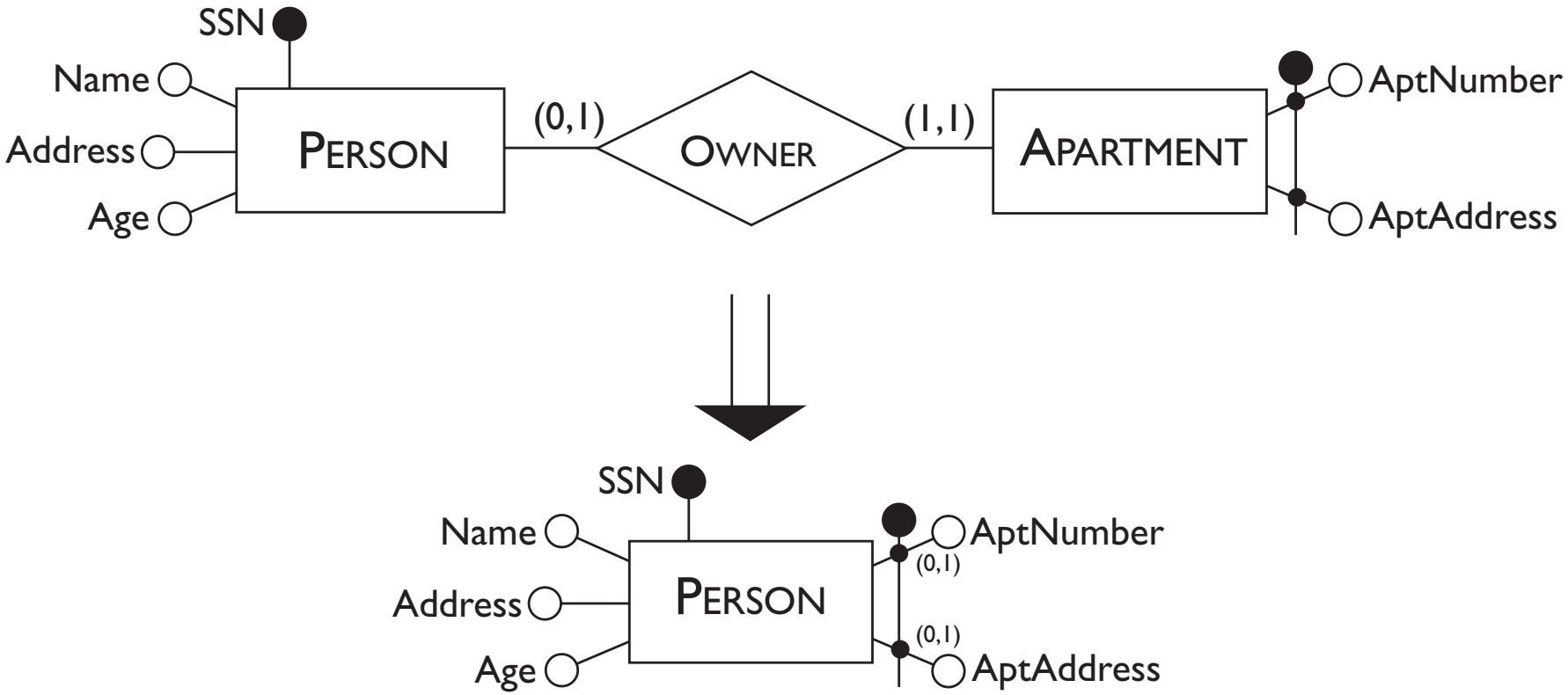
Example of partitioning of entities



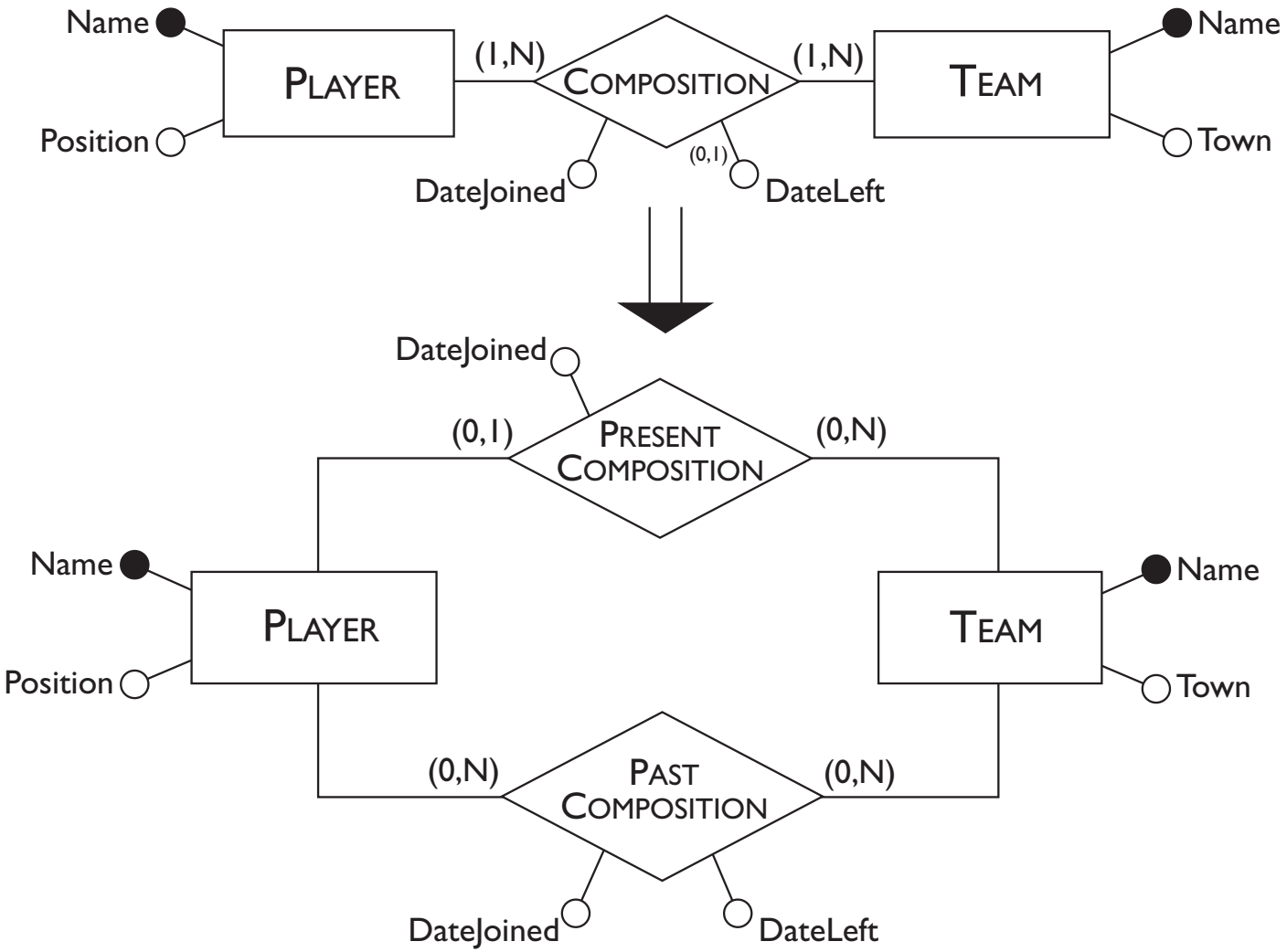
Example of deletion of multi-value attributes



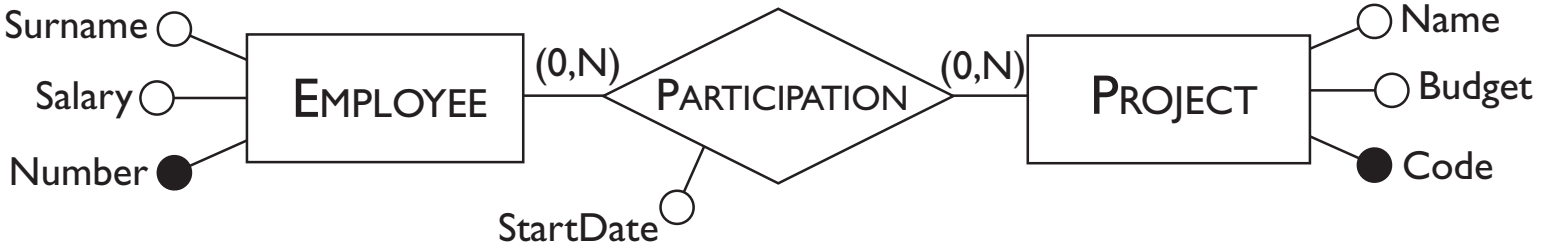
Example of merging of entities



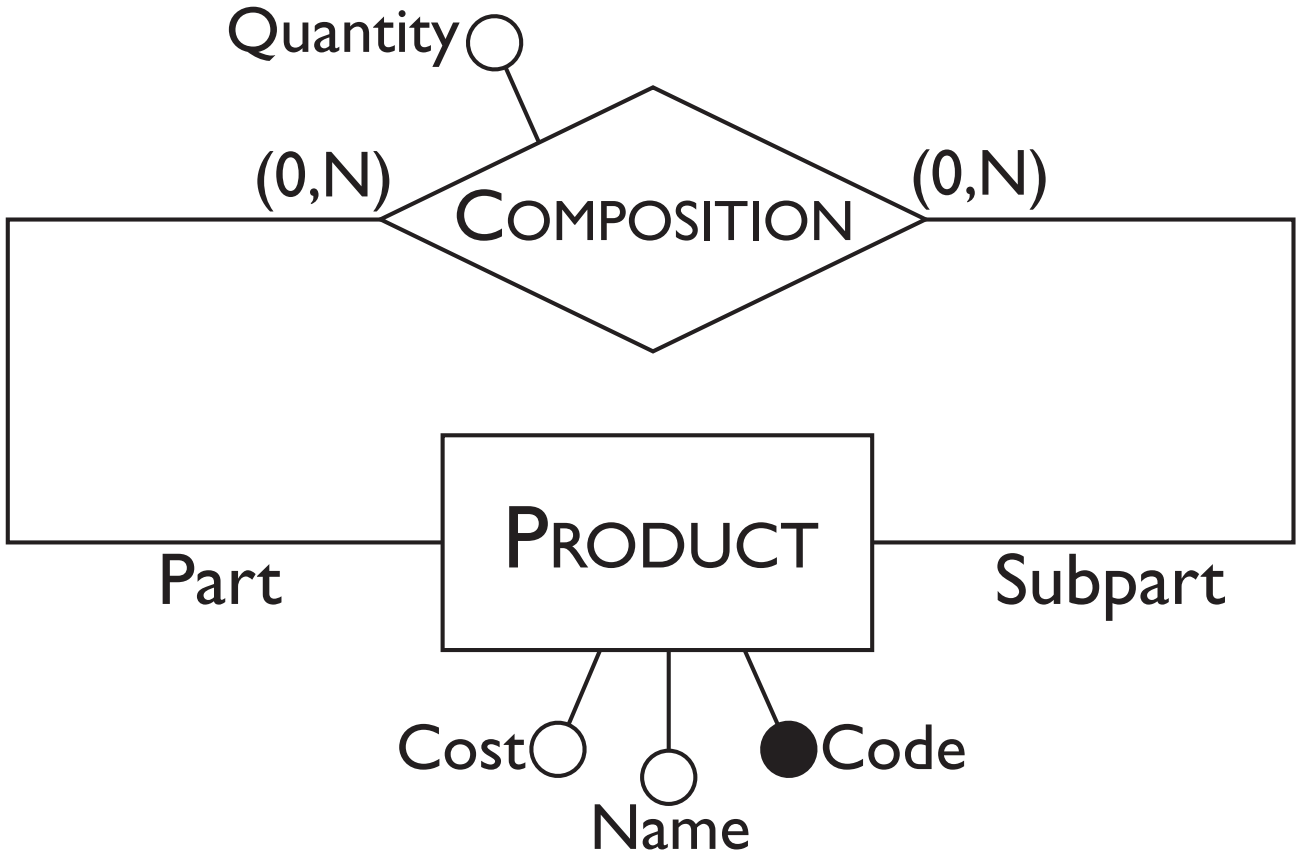
Example of partitioning of a relationship



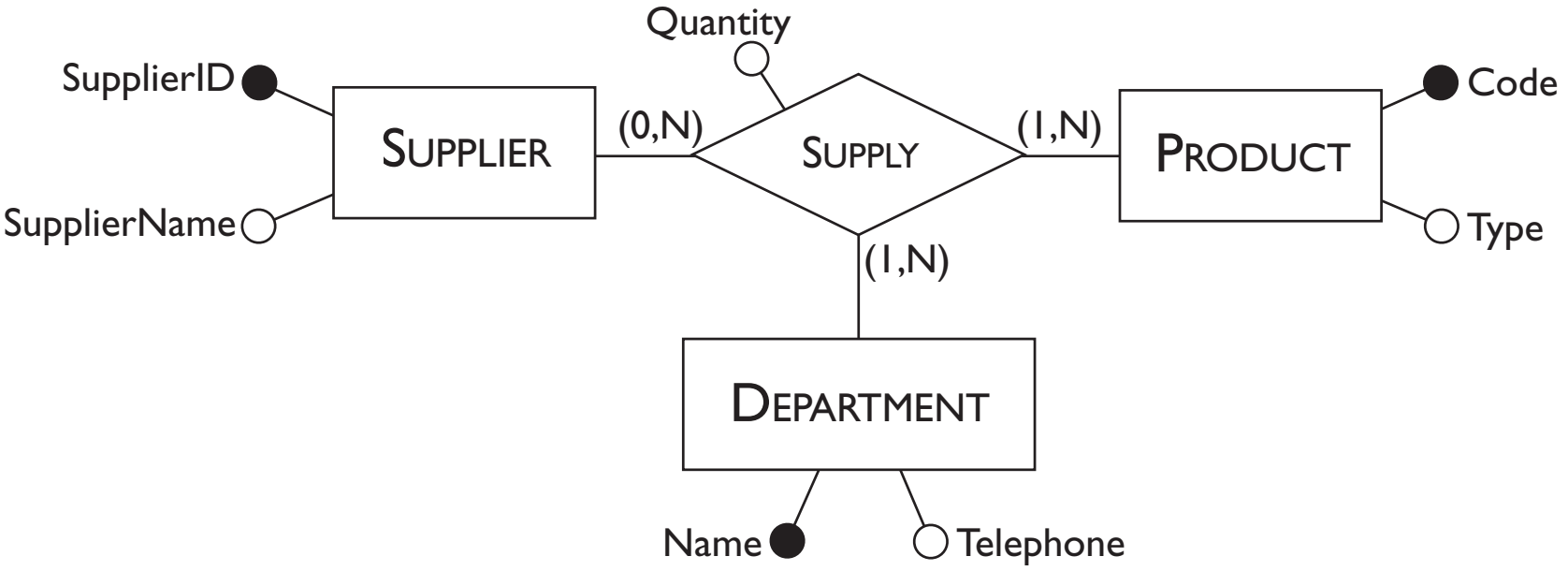
An E-R schema with a many-to-many relationship



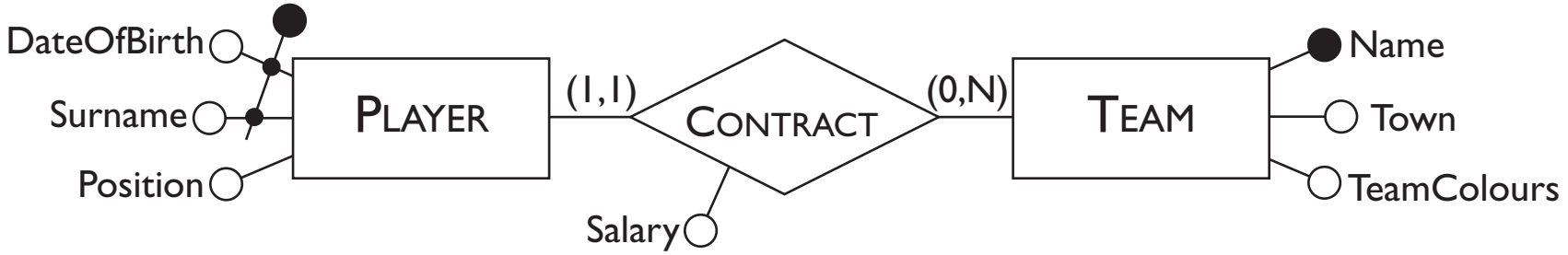
E-R schema with recursive relationship



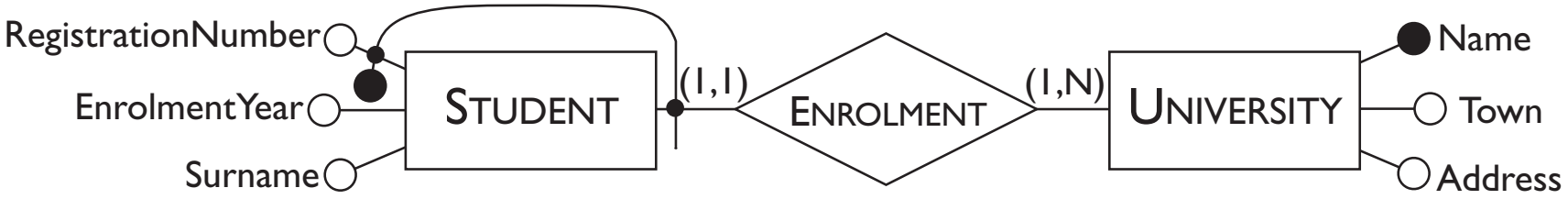
E-R schema with ternary relationship



E-R schema with one-to-many relationships



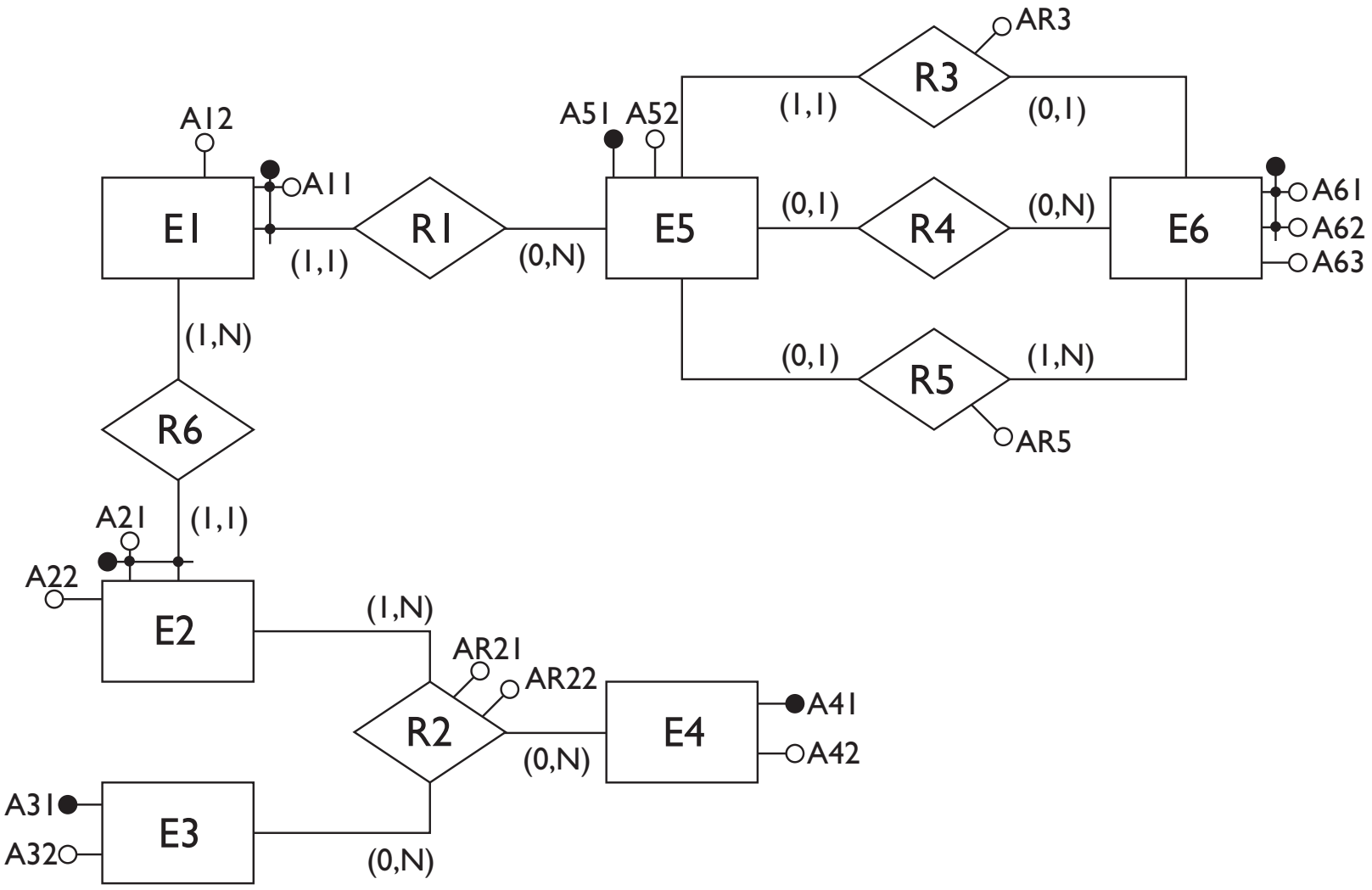
E-R schema with external identifier



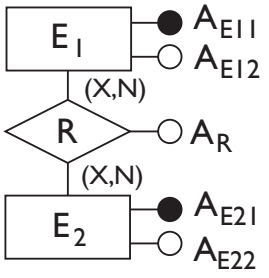
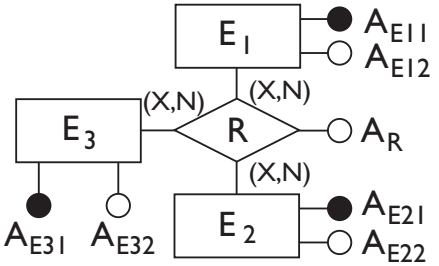
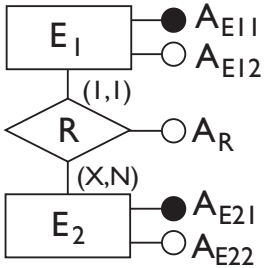
E-R schema with one-to-one relationship

E-R schema with one-to-one relationship

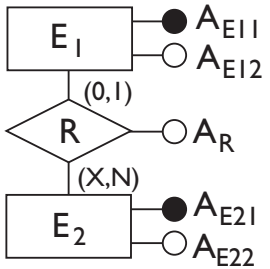
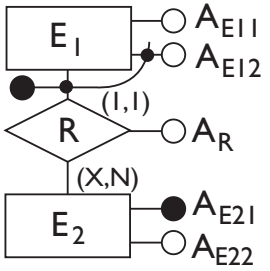
An E-R schema for translation



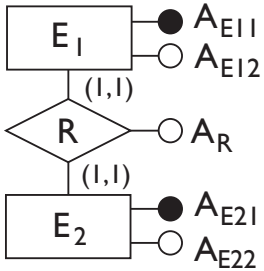
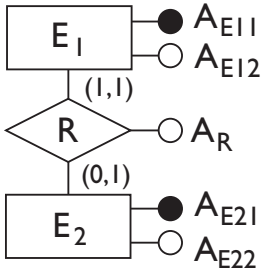
Translations from the E-R model to the relational (1)

Type	Initial schema	Possible translation
Binary many-to-many relationship		E1(AE11,AE12) E2(AE21,AE22) R(AE11, AE21,AR)
Ternary many-to-many relationship		E1(AE11,AE12) E2(AE21,AE22) E3(AE31,AE32) R(AE11, AE21, AE31,AR)
One-to-many relationship with mandatory participation		E1(AE11,AE12,AE21,AR) E2(AE21,AE22)

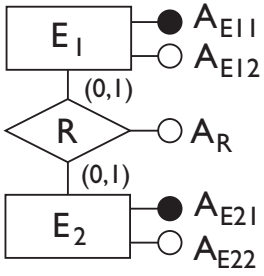
Translations from the E-R model to the relational (2)

Type	Initial schema	Possible translation
One-to-many relationship with optional participation		$E_1(\underline{A_{E11}}, A_{E12})$ $E_2(\underline{A_{E21}}, A_{E22})$ $R(\underline{A_{E11}}, \underline{A_{E21}}, A_R)$ Alternatively: $E_1(\underline{A_{E11}}, A_{E21}, A^*_{E21}, A^*_R)$ $E_2(\underline{A_{E21}}, A_{E22})$
Relationship with external identifiers		$E_1(\underline{A_{E12}}, \underline{A_{E21}}, A_{E11}, A_R)$ $E_2(\underline{A_{E21}}, A_{E22})$

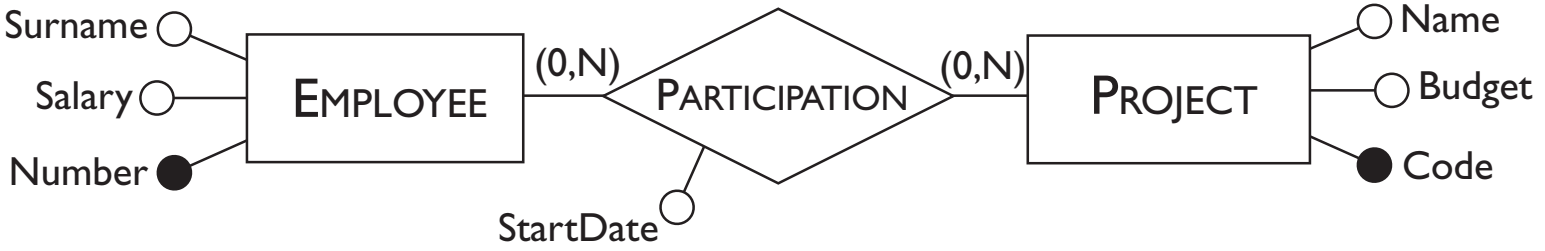
Translations from the E-R model to the relational (3)

Type	Initial schema	Possible translation
One-to-one relationship with mandatory participation for both entities		$E_1(\underline{A_{E11}}, A_{E12}, \underline{A_{E21}}, A_R)$ $E_2(\underline{A_{E21}}, A_{E22})$ Alternatively: $E_2(\underline{A_{E21}}, A_{E22}, \underline{A_{E11}}, A_R)$ $E_1(\underline{A_{E11}}, A_{E12})$
One-to-one relationship with optional participation for one entity		$E_1(\underline{A_{E11}}, A_{E12}, \underline{A_{E21}}, A_R)$ $E_2(\underline{A_{E21}}, A_{E22})$

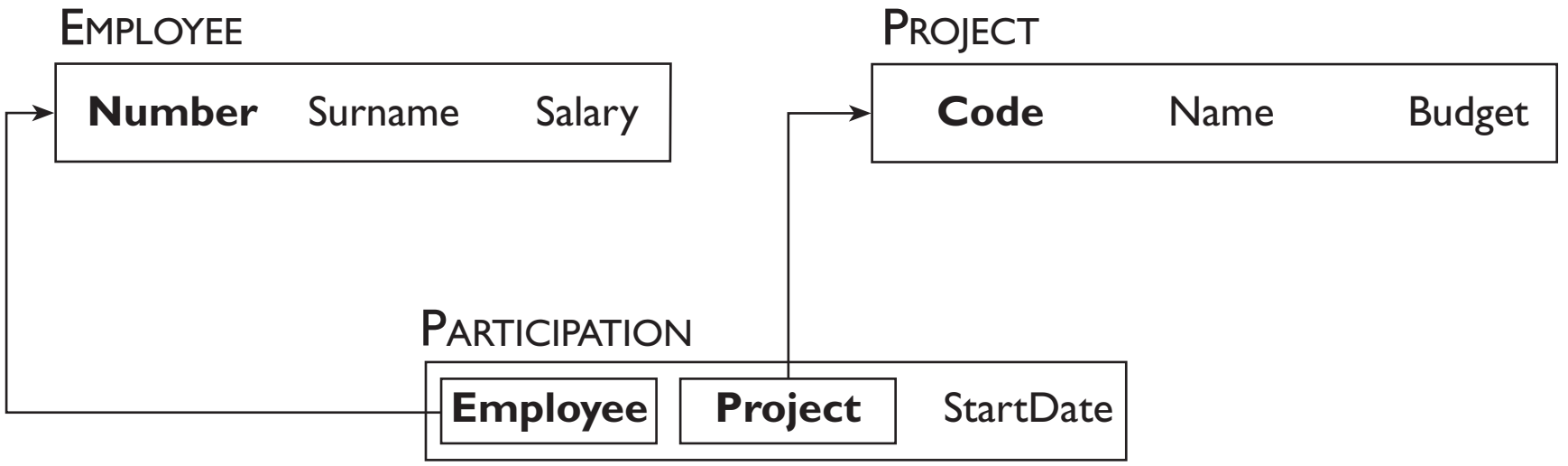
Translations from the E-R model to the relational (4)

Type	Initial schema	Possible translation
One-to-one relationship with optional participation for both entities		$E_1(\underline{A_{E11}}, A_{E21})$ $E_2(\underline{A_{E21}}, A_{E22}, A^*_{E11}, A^*_R)$ Alternatively: $E_1(\underline{A_{E11}}, A_{E12}, A^*_{E21}, A^*_R)$ $E_2(\underline{A_{E21}}, A_{E22})$ Alternatively: $E_1(\underline{A_{E11}}, A_{E12})$ $E_2(\underline{A_{E21}}, A_{E22})$ $R(\underline{A_{E11}}, \underline{A_{E21}}, A_R)$

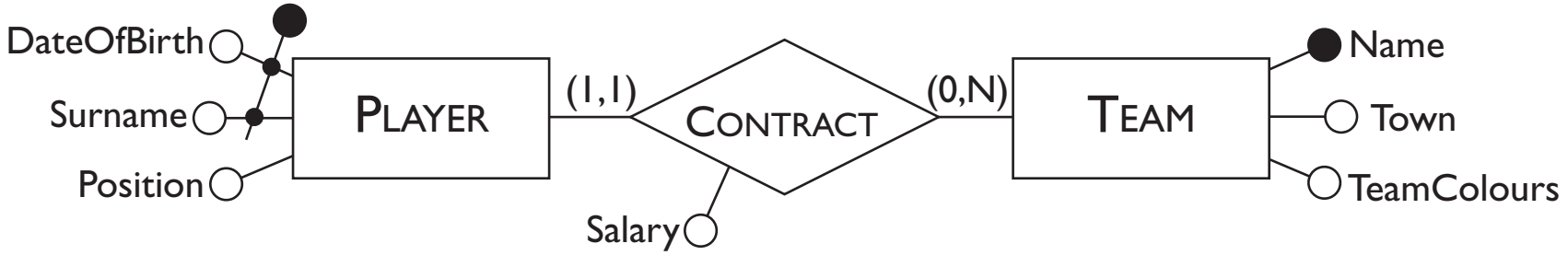
An E-R schema with a many-to-many relationship



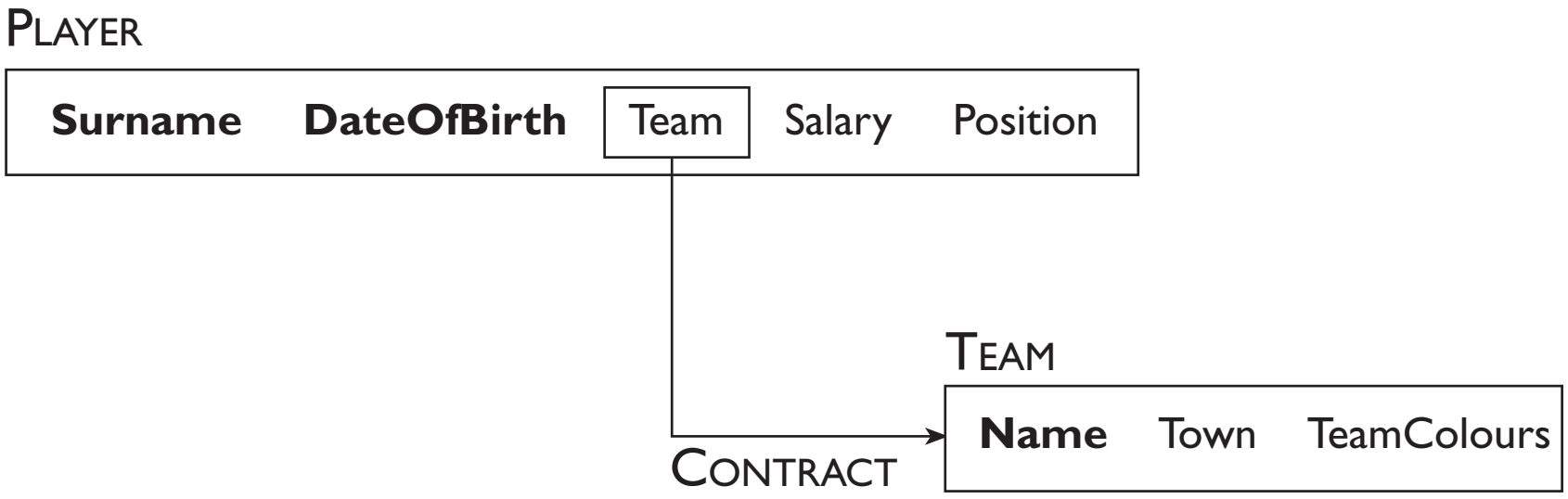
Graphical representation of a translation of the previous schema



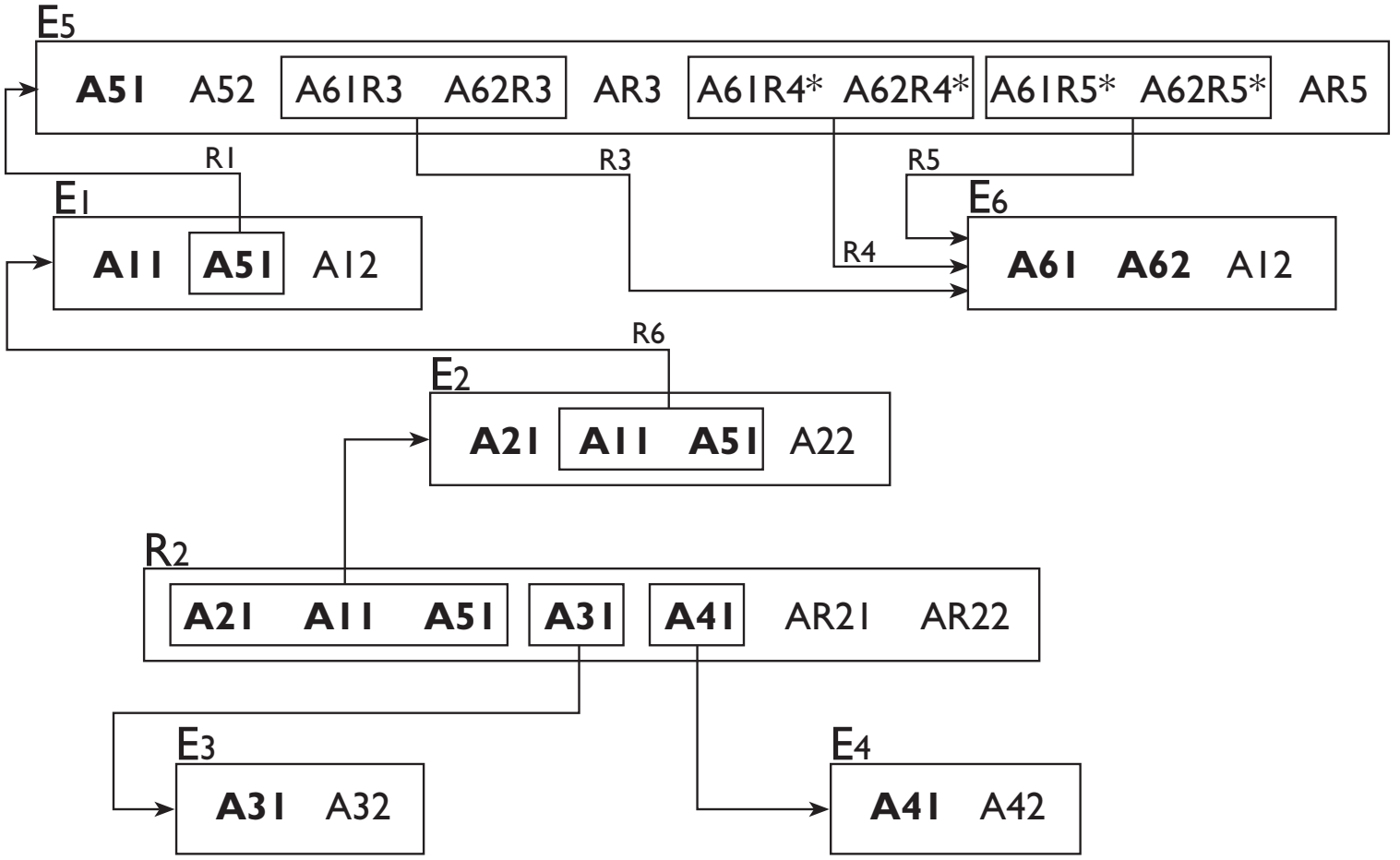
E-R schema with one-to-many relationships



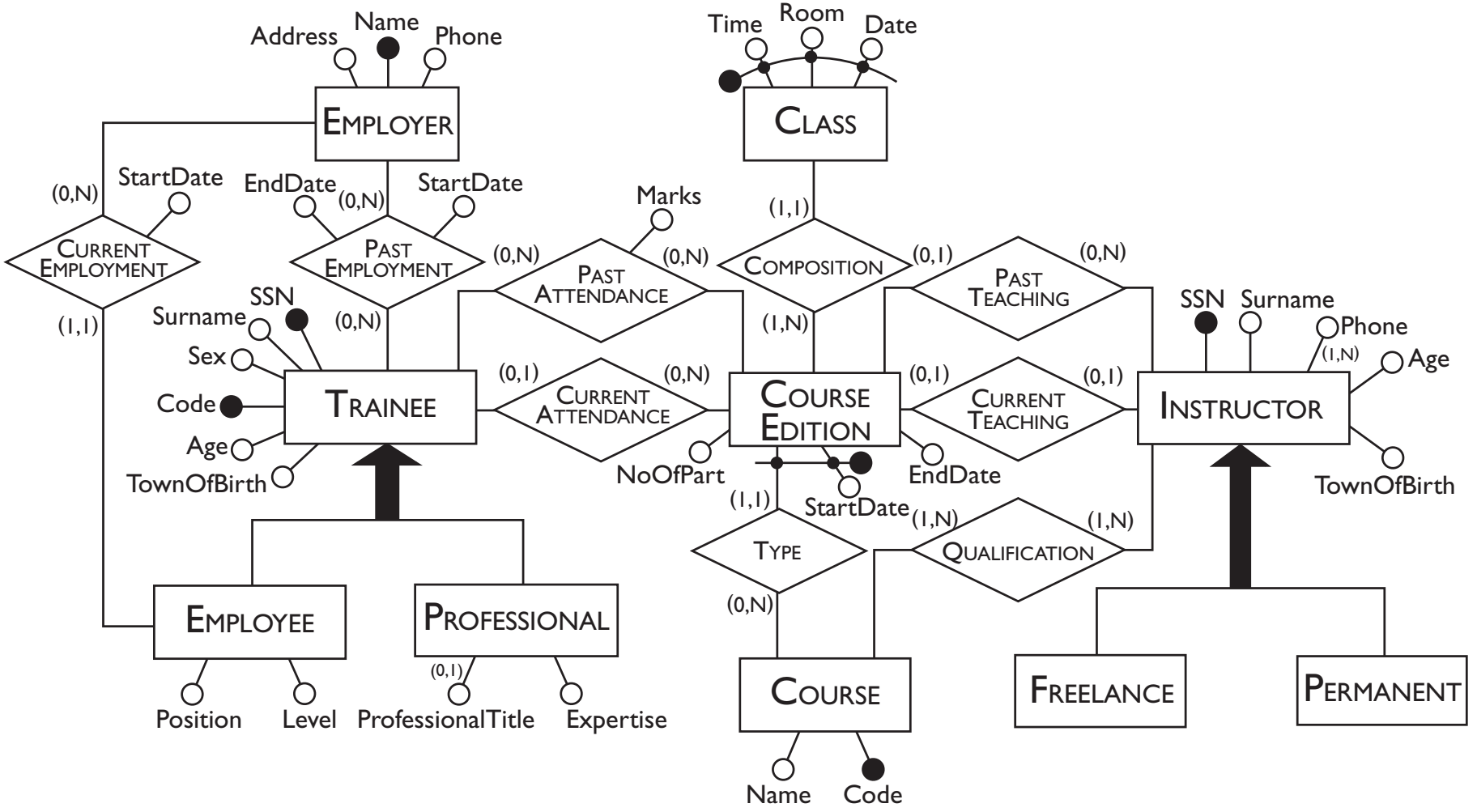
Graphical representation of a translation of the previous schema



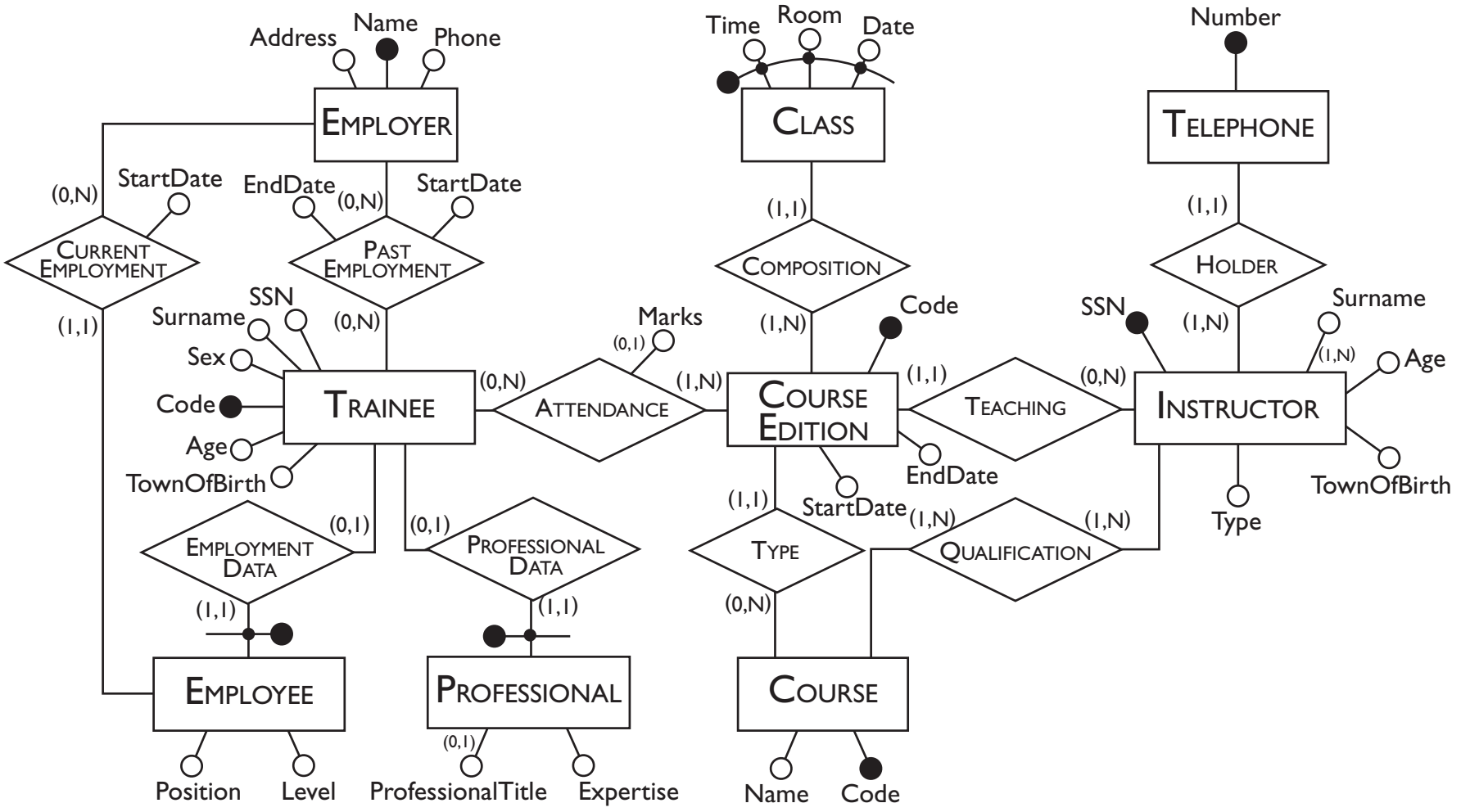
Graphical representation of a relational schema



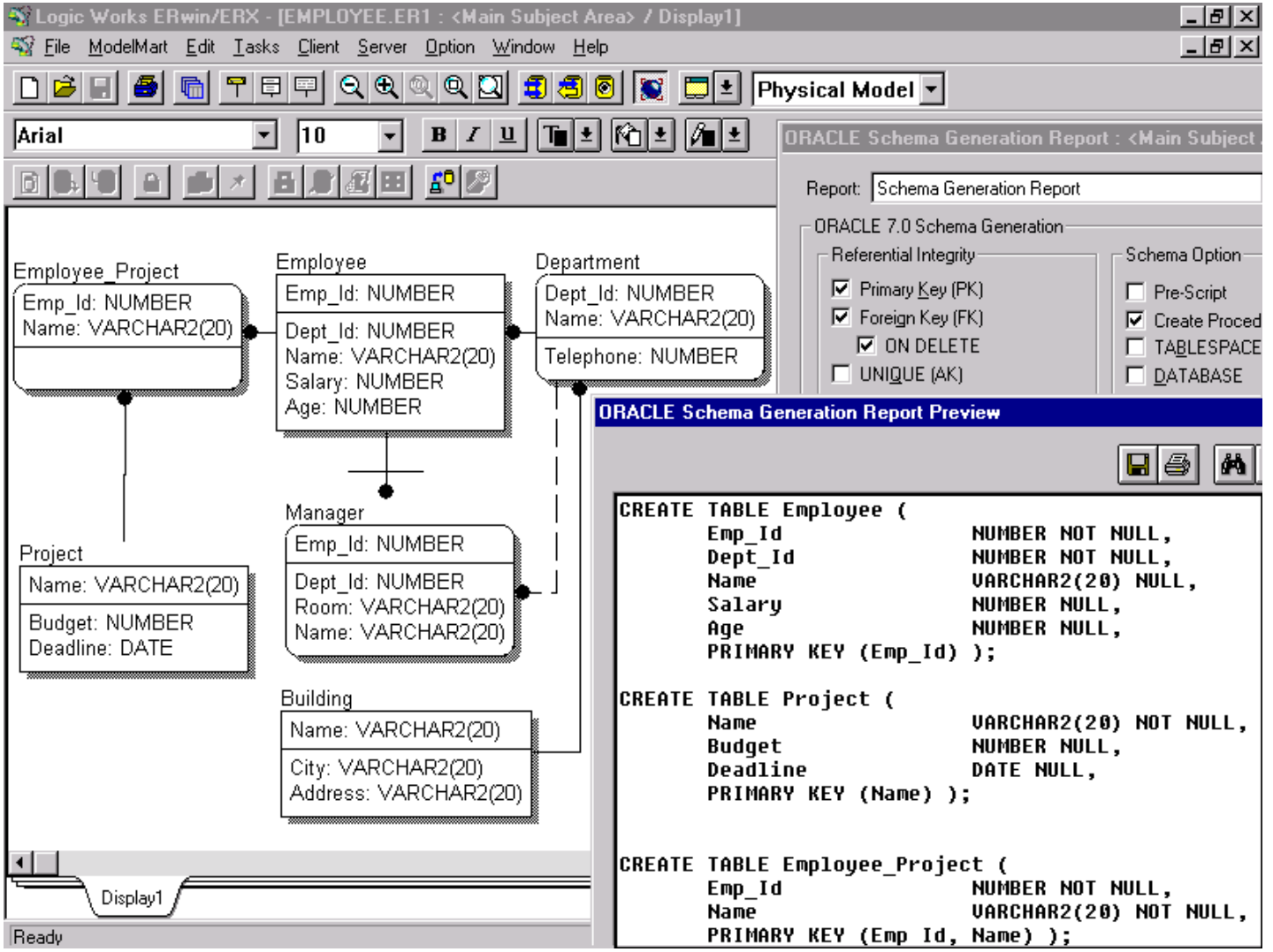
The E-R schema of a training company



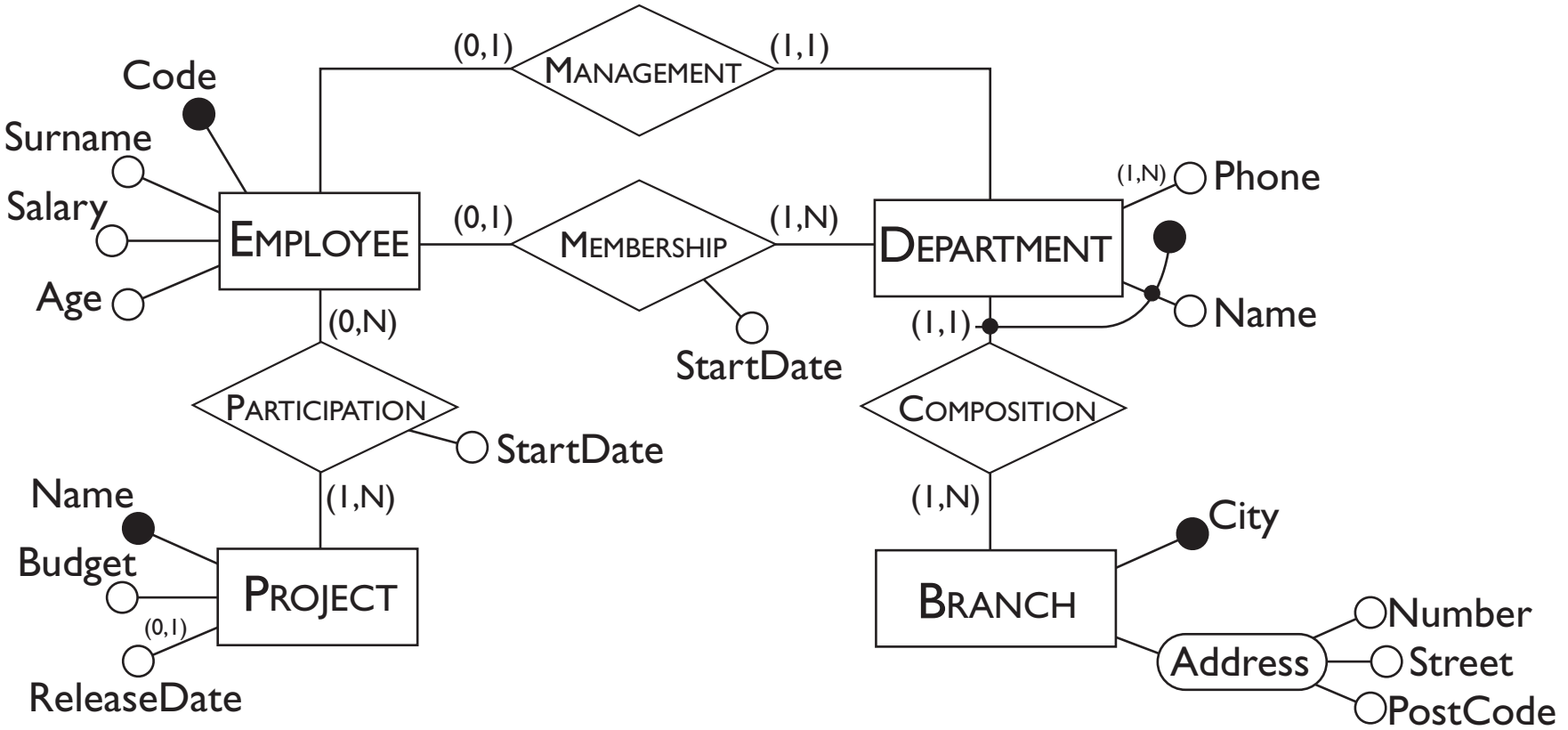
The previous E-R schema after the restructuring phase



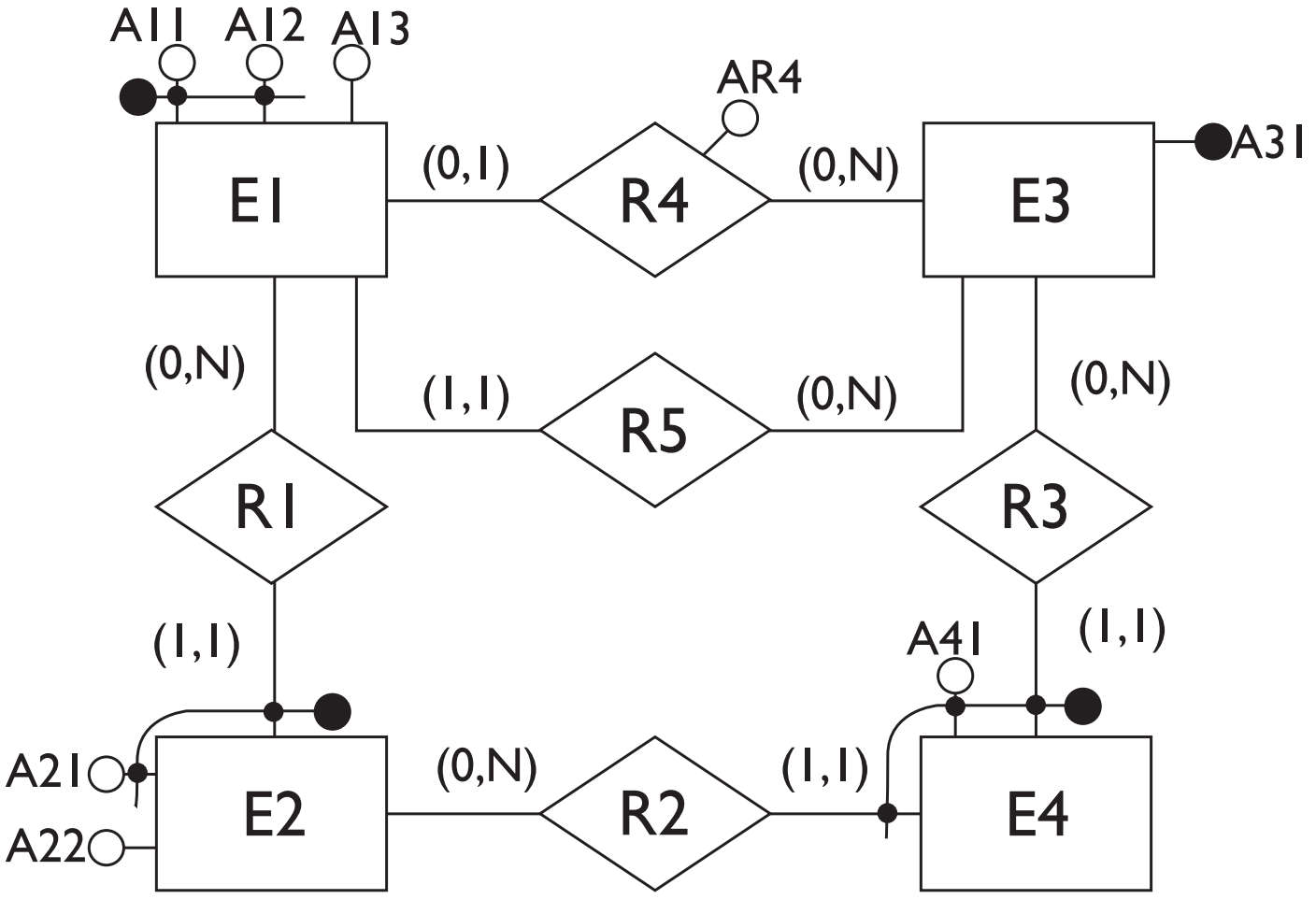
Logical design with a CASE tool



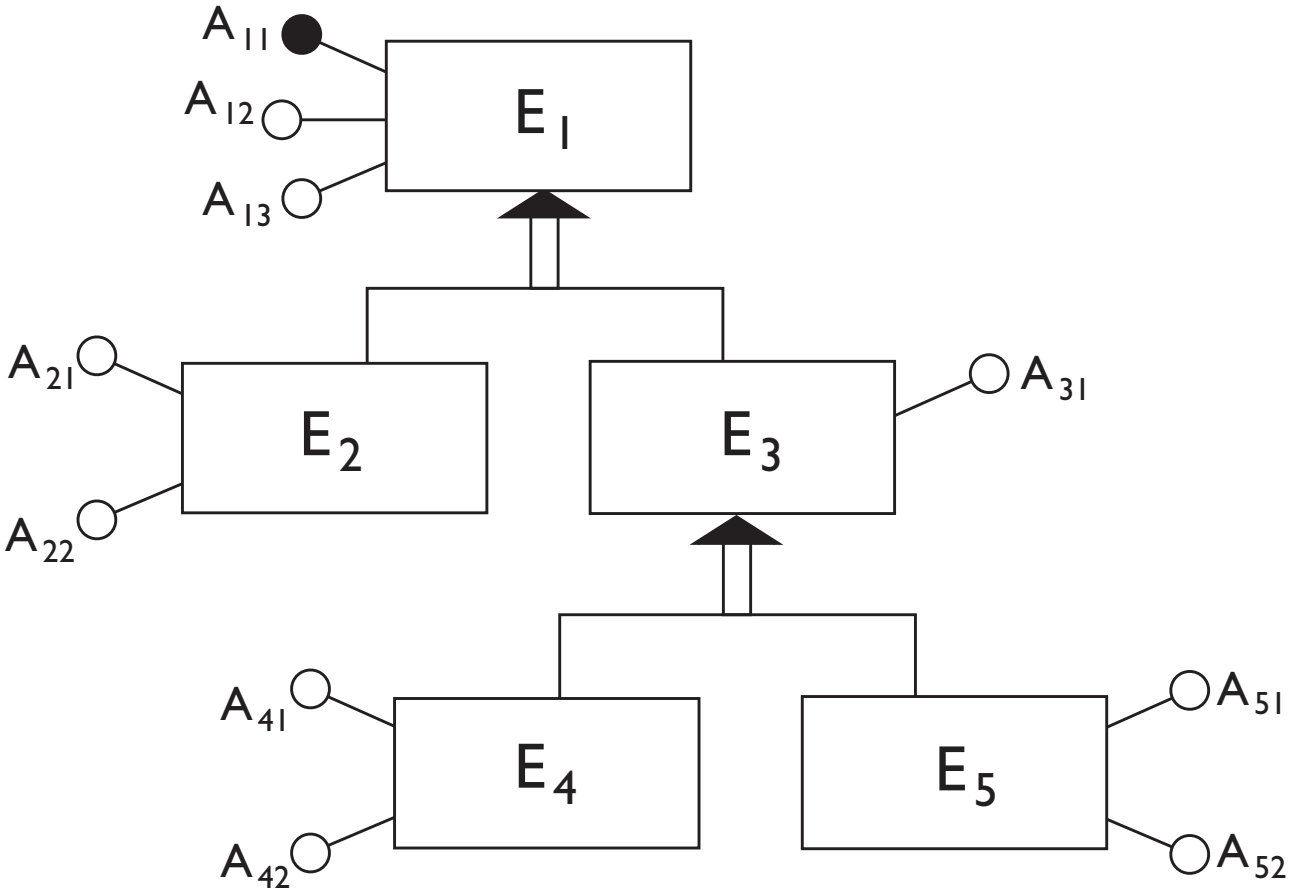
An E-R schema on the personnel of a company



An E-R schema with external identifiers



An E-R schema with generalizations



An E-R schema to translate