Mapping ER Diagram to Relational Model

Supp Material A

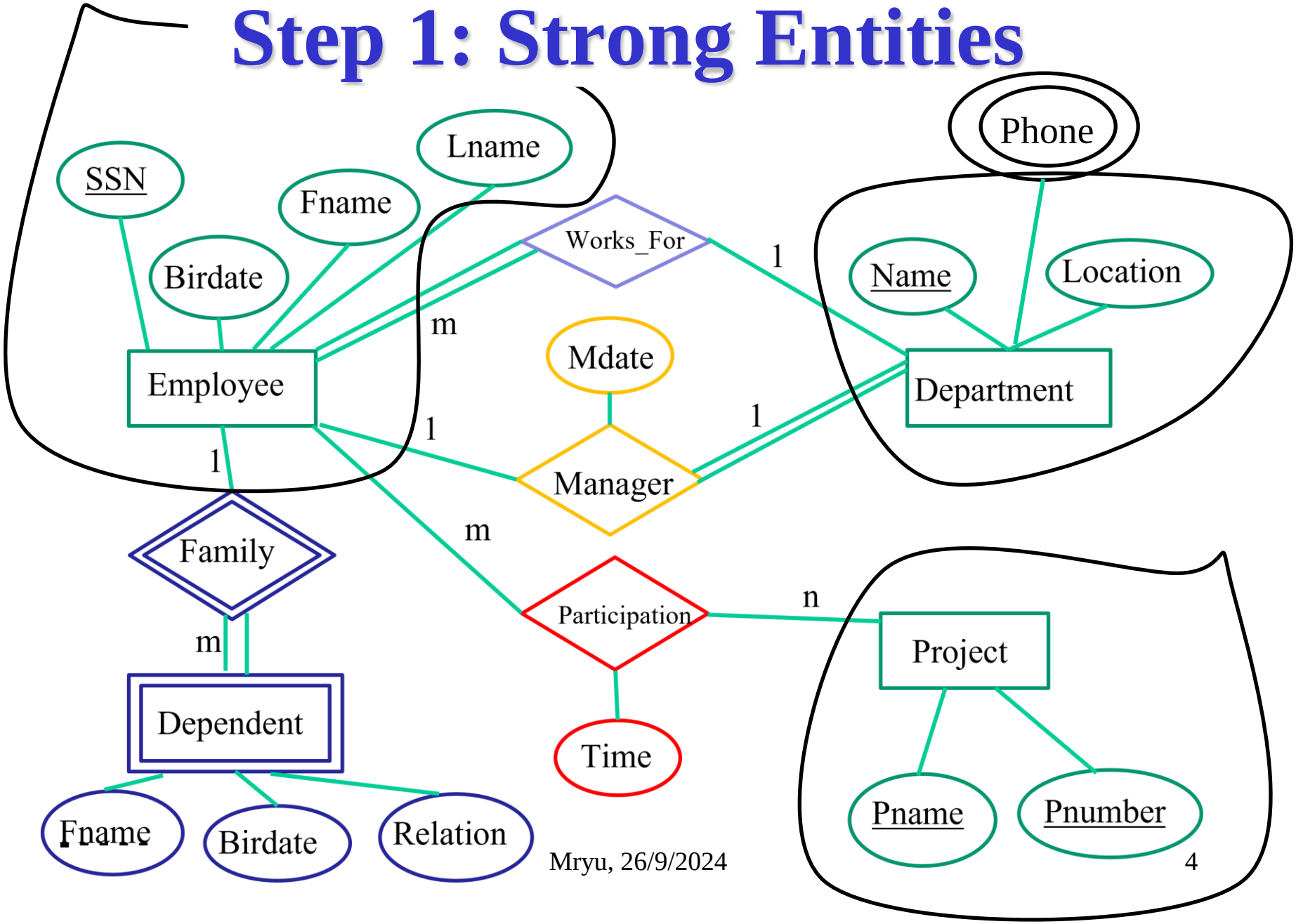
Assumption

Binary relations are sufficient

Step 1: Strong Entities

- For each ***strong/regular entity*** (not weak entity) type E:
- Create a new relation R with
  - **Attributes of R:** all simple attributes (and simple components of composite attributes) of E
  - **Key of R:** key of E as the primary key for the relation

Step 1: Strong Entities



Step 1: Strong Entities

Employee

SSN	Fname	Lname	Birdate

Department

Name	Location

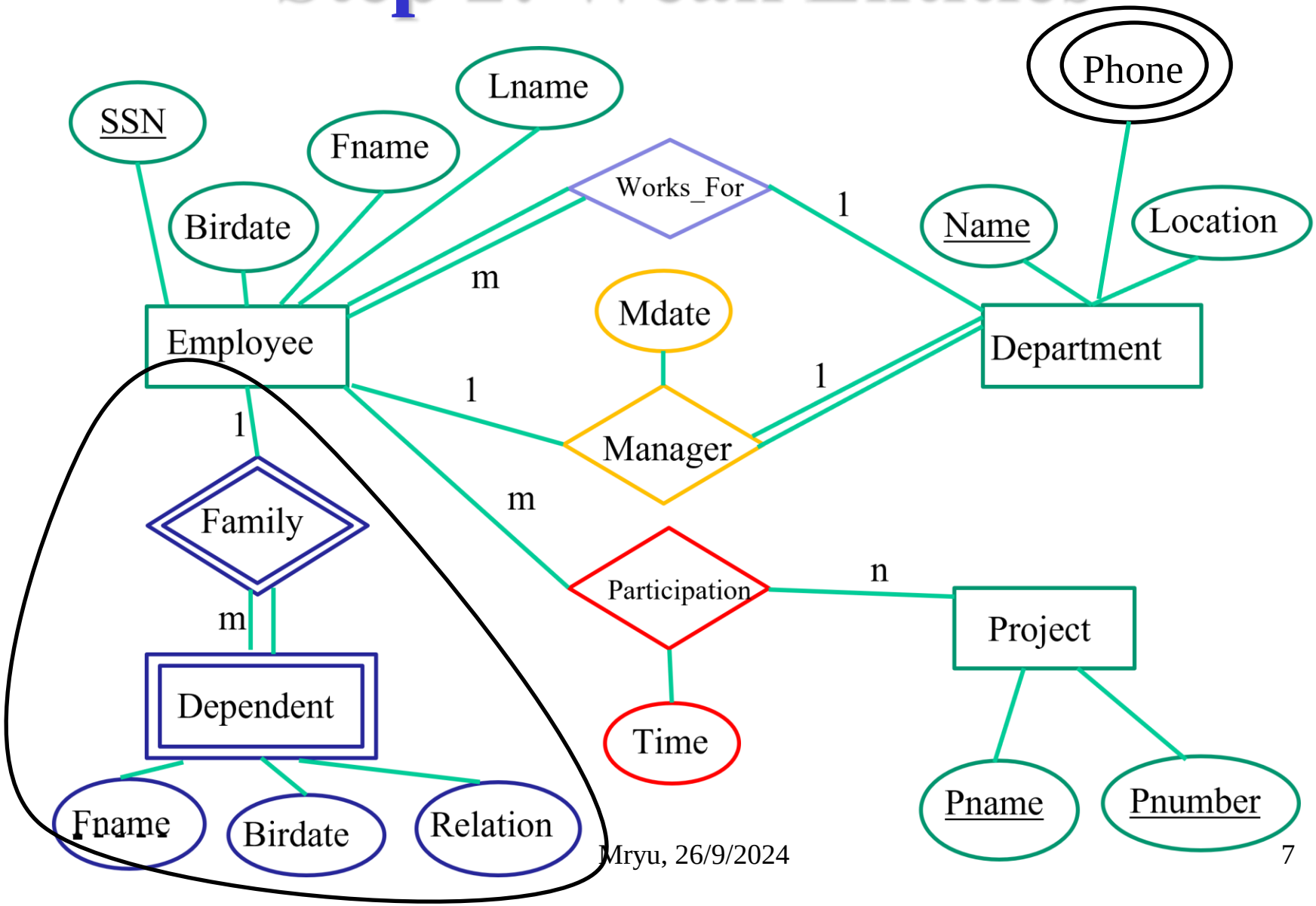
Project

Pname	Pnumber

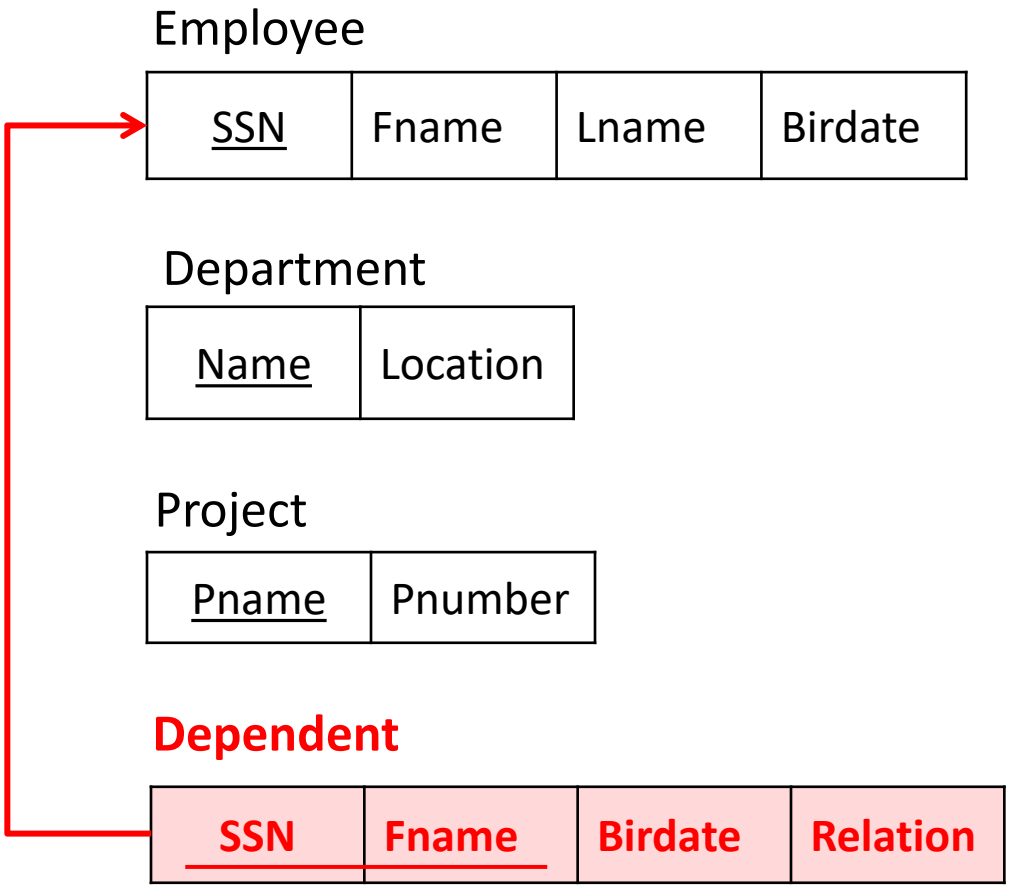
Step 2: Weak Entities

- For each ***weak entity type*** W with the owner entity type E:
- Create a new relation R with
  - **Attributes of R**:
    - all simple attributes (and simple components of composite attributes) of W
    - primary key attributes of relation derived from E
  - **Key of R**: foreign key to E and partial key of W

Step 2: Weak Entities



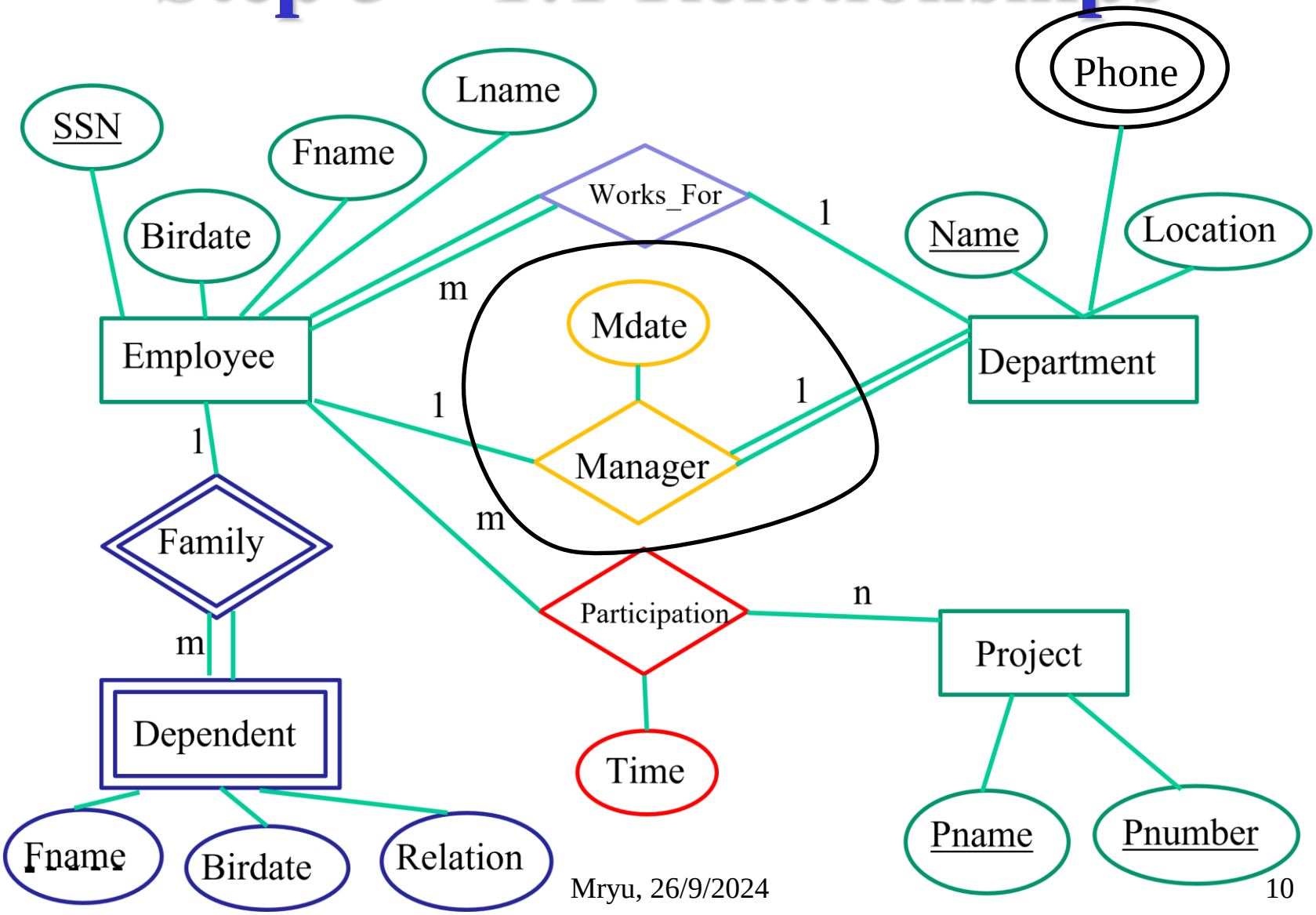
Step 2: Weak Entities



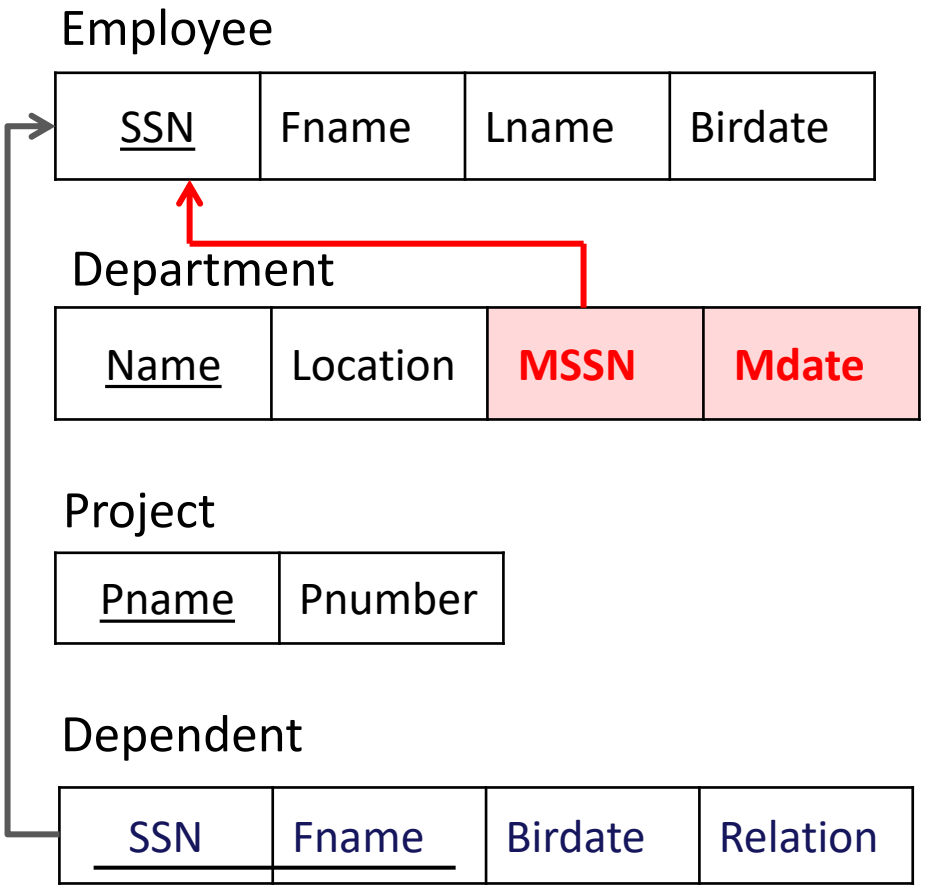
Step 3 – 1:1 Relationships

- For each ***1:1 relationship type*** B. Let S and T be the participating entity types
- Steps
  - Choose one of S and T (let S be one that participates totally if there is one)
    1. Add attributes from primary key of T to S as a foreign key
    2. Add all simple attributes (and simple components of composite attributes) of B as attributes of S

Step 3 – 1:1 Relationships



Step 3 – 1:1 Relationships

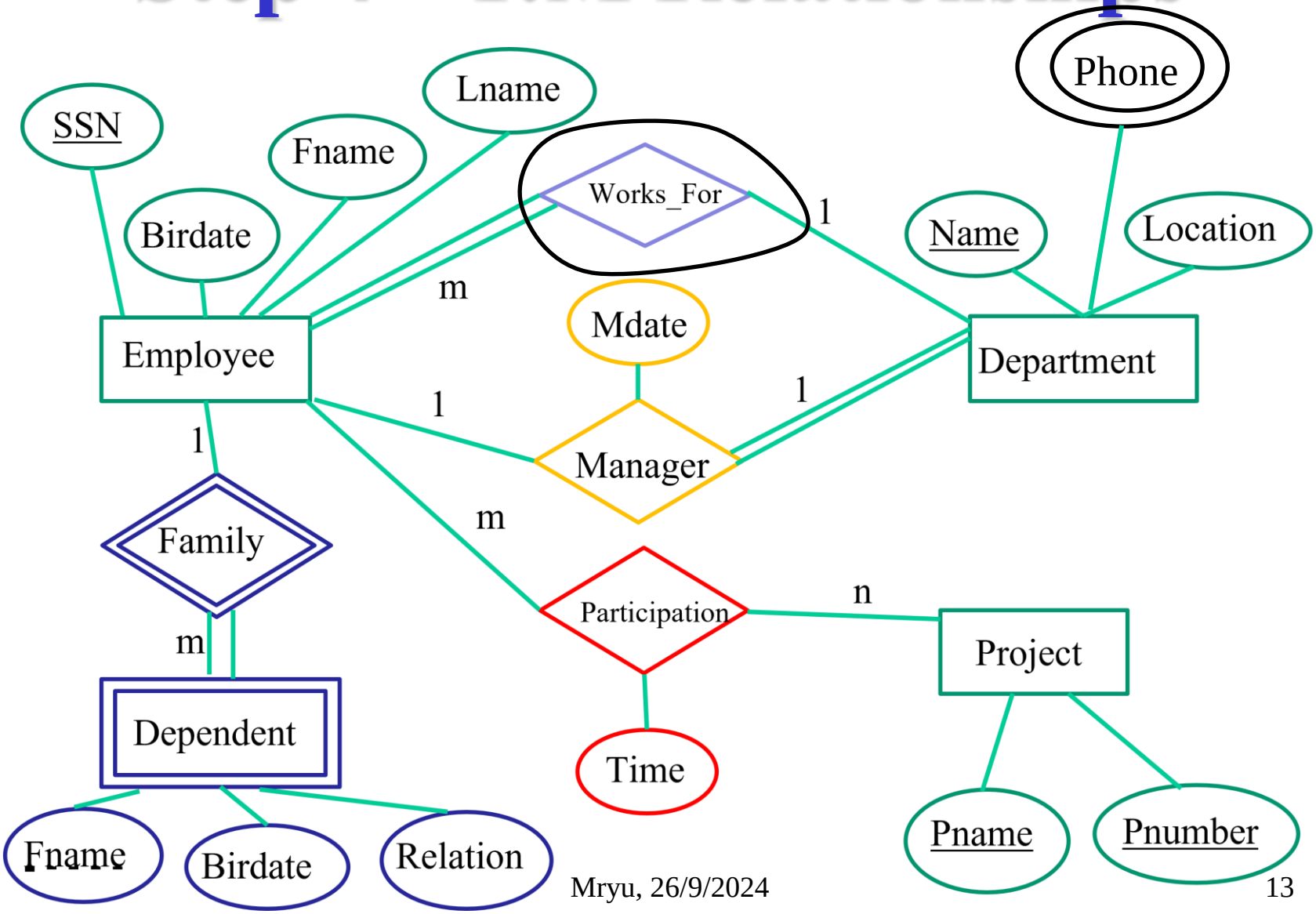


Step 4 – 1:M Relationships

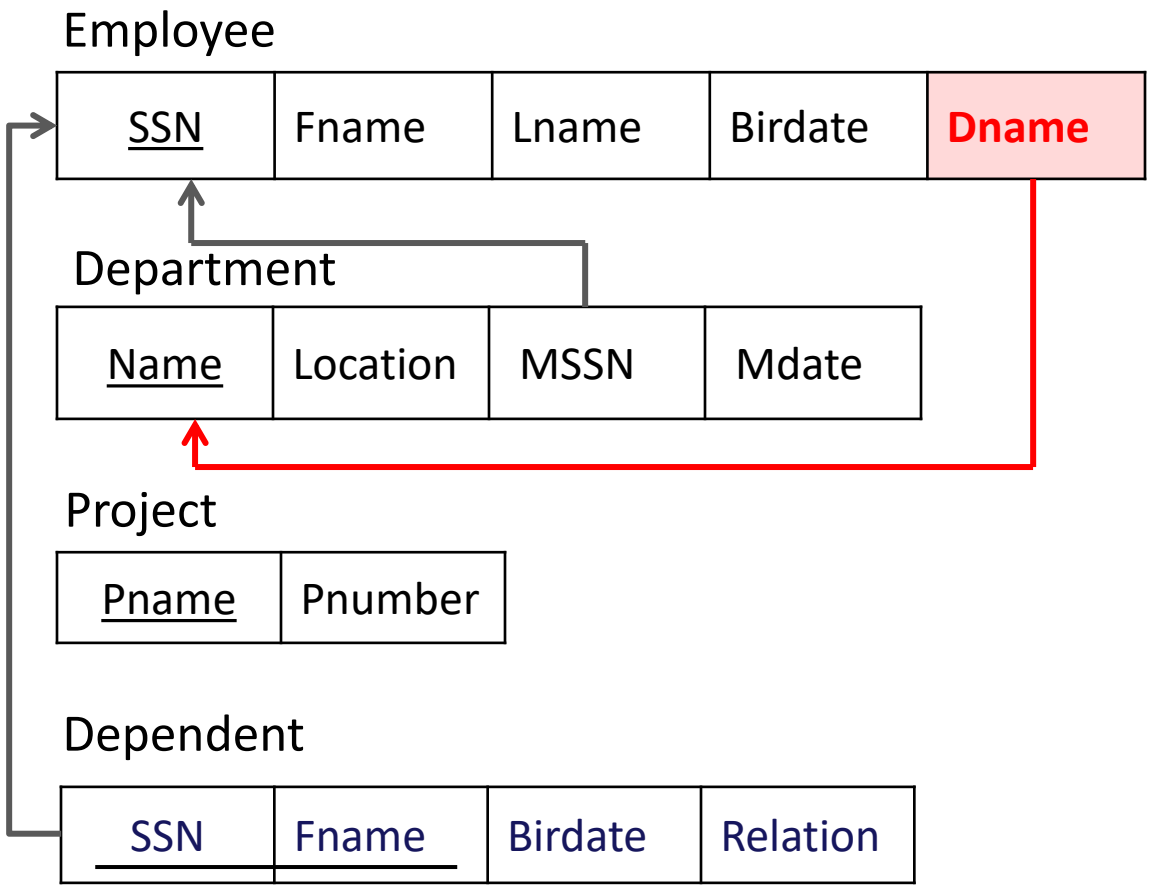
- For each ***1:N relationship type*** B. *Let S and T be the participating entity types, where S is on the 1 side and T on the N side*
- Steps
  - Add to relation belonging to entity T
    - attributes from primary key of S as a foreign key
    - any simple attributes (or simple components of composite attributes) from relationship B

(This step doesn't add any new tuples, just attributes.)

Step 4 – 1:M Relationships



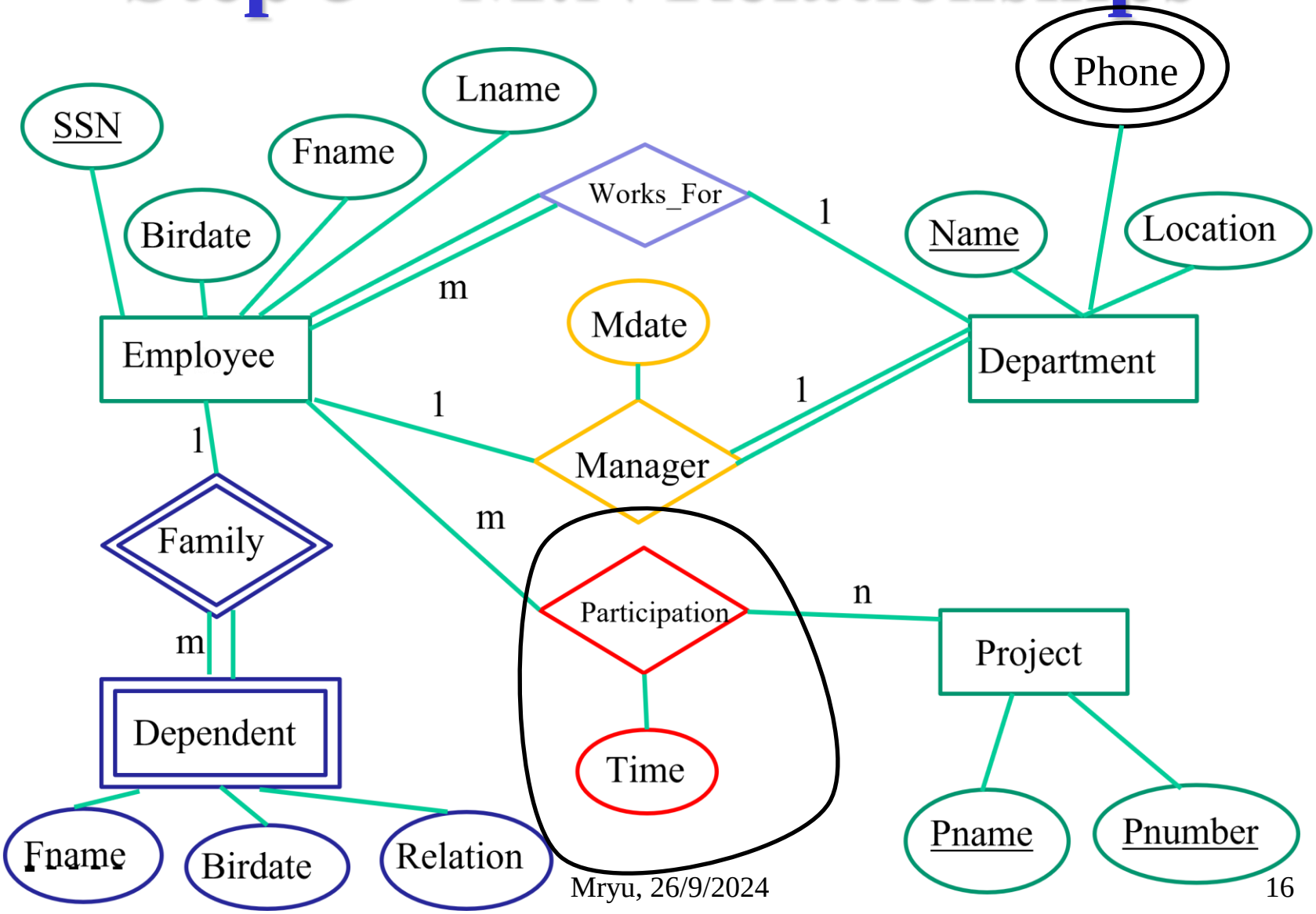
Step 4 – 1:M Relationships



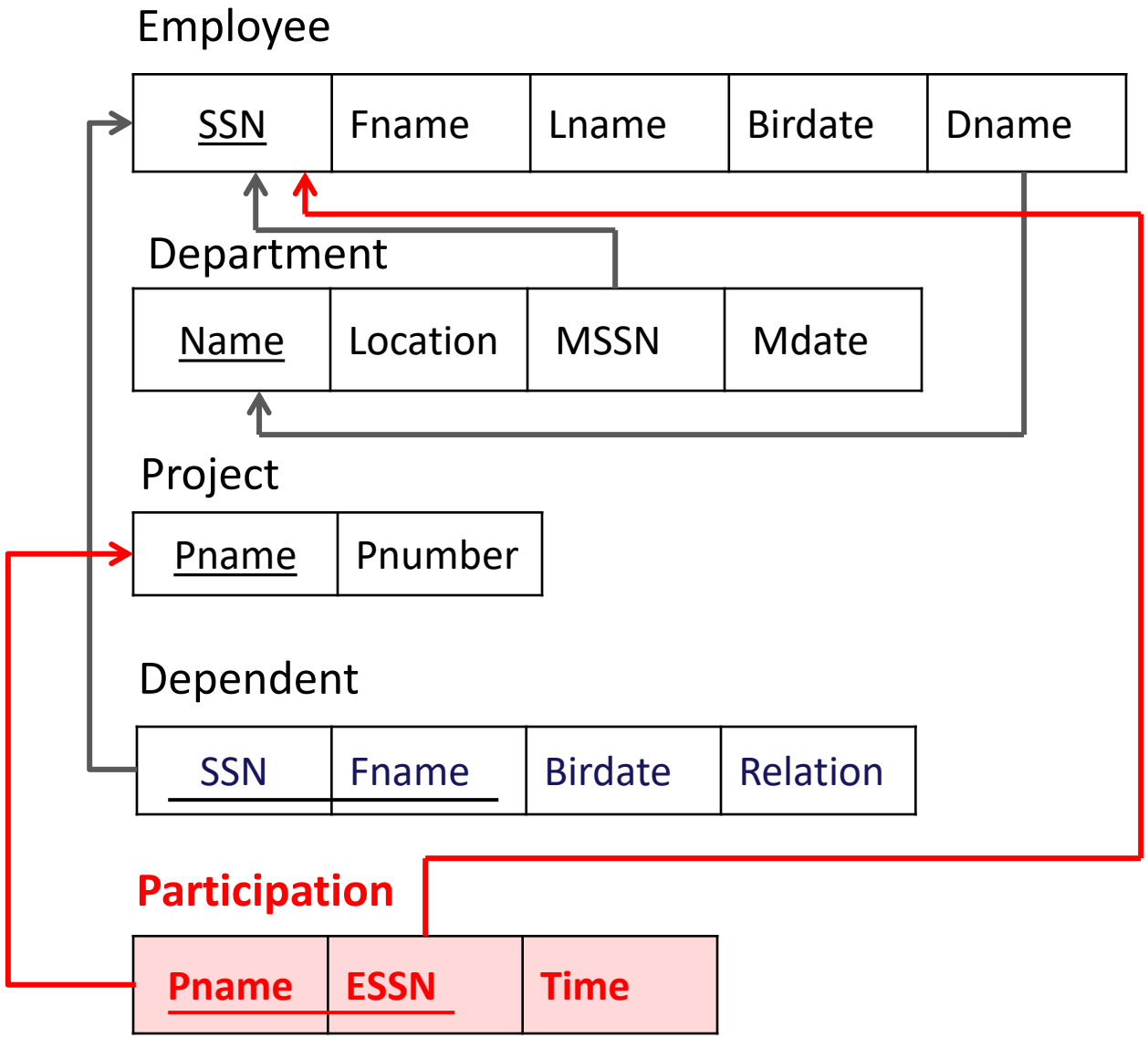
Step 5 – M:N Relationships

- For each ***N:M relationship type*** B. *Let S and T be the participating entity types*
- Create a new relation R with
  - **Attributes of R**:
    - Attributes from key of S as foreign key
    - Attributes from key of T as foreign key
    - Simple attributes, and simple components of composite attributes of relation B
  - **Key of R**: All attributes from key of S and key of T

Step 5 – M:N Relationships



Step 5 – M:N Relationships

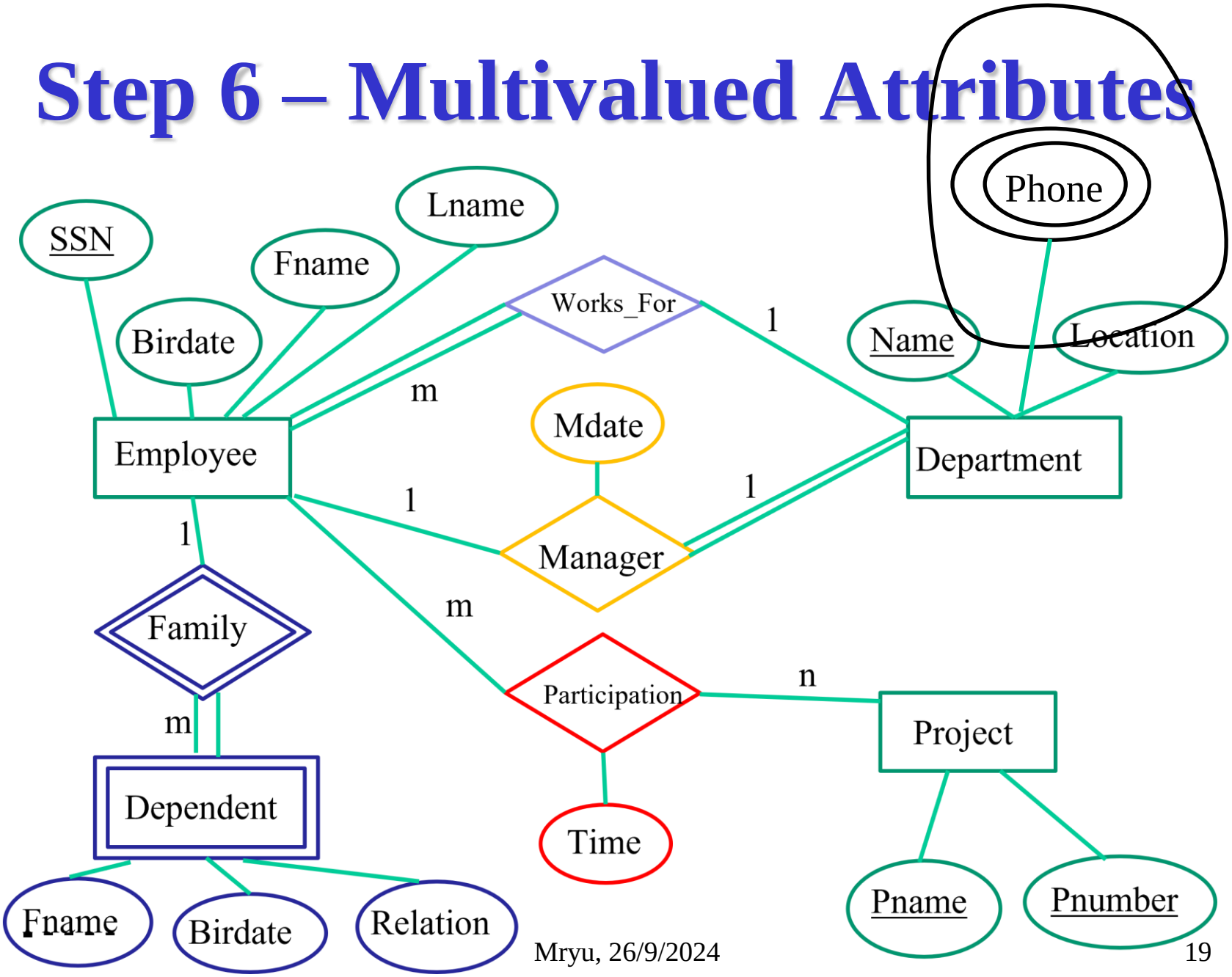


Step 6 – Multivalued Attributes

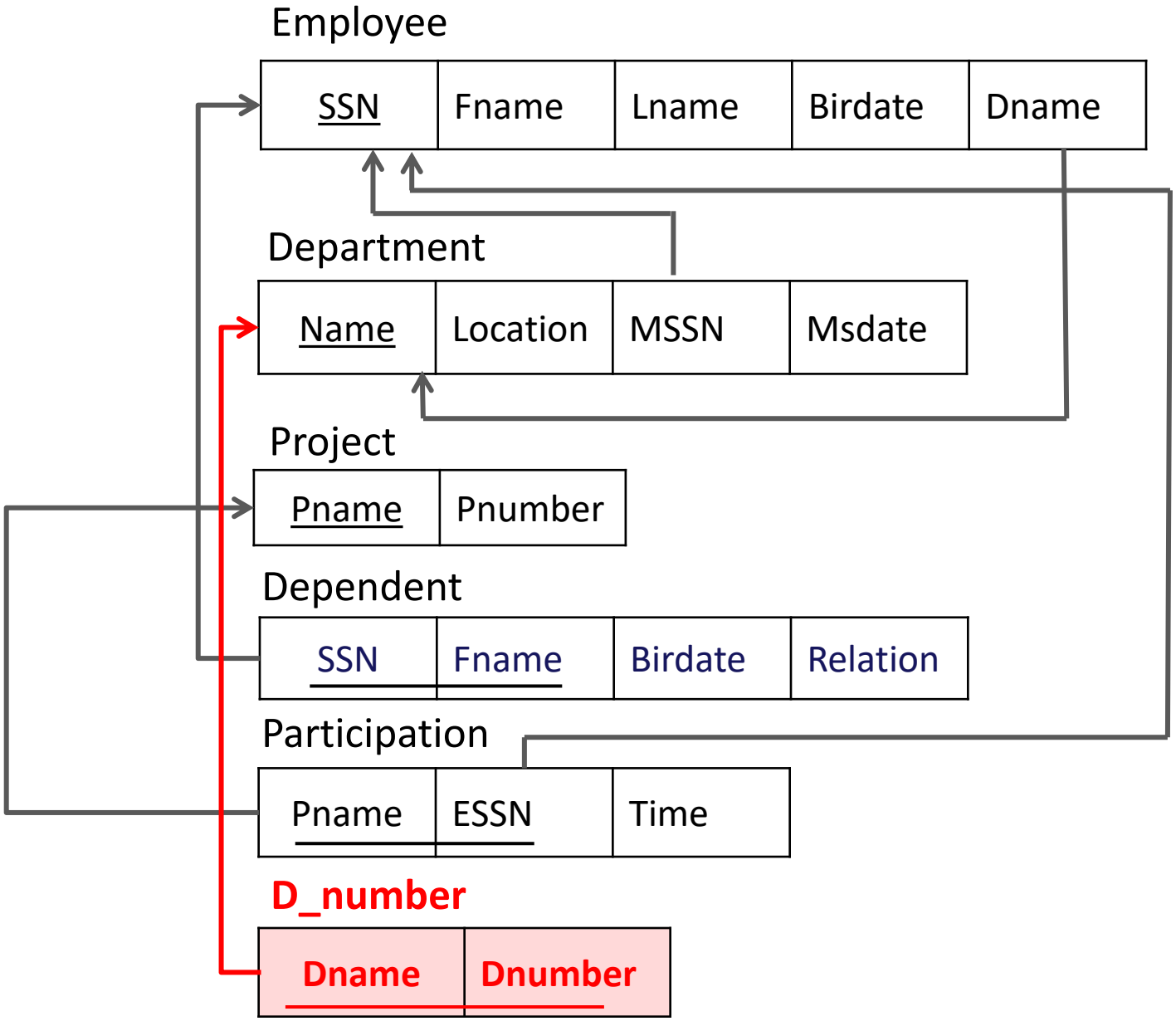
- For each ***multivalued attribute*** A, where A is an attribute of E, create a new relation R.
- *If A is a multivalued simple attribute,*
  - Attributes of R = Simple attribute A, and key of E as a foreign key.
- *If A is a multivalued composite attribute,*
  - Attributes of R = All simple components of A, and key of E as a foreign key.

- In both cases, the primary key of R is the set of all attributes in R.

Step 6 – Multivalued Attributes



Step 6 – Multivalued Attributes



Step 7: N-ary Relationships

- For each ***n-ary relationship type*** (n > 2)
- Create a new relation R with
  - Attributes : same for mapping M:N.
  - Key :
    - Same for mapping M:N, see exception below
    - The exception is that that if one of the participating entity types has participation ratio 1, its key can be used as a key for the new relation.

- *(Advice: binary relationships simpler to model)*

References

- Some slides are inspired by my own teaching materials in the past.