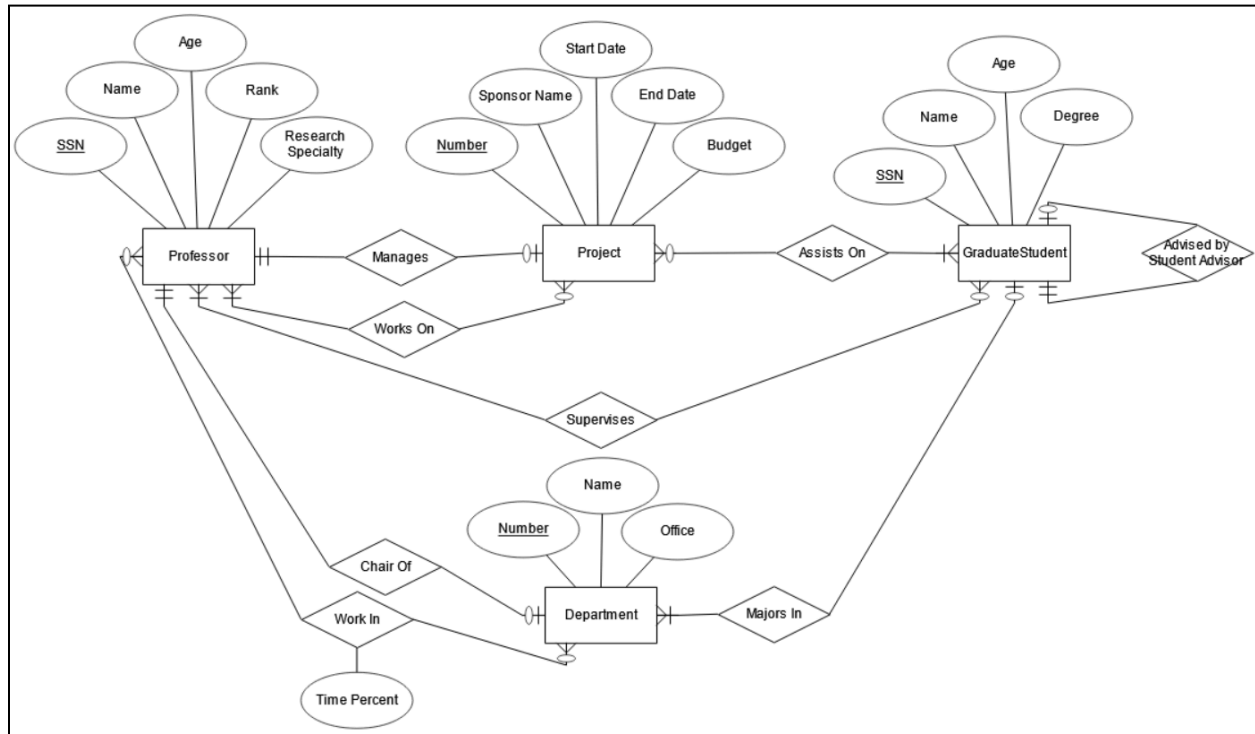


1.4 University



ENTITIES & ATTRIBUTES

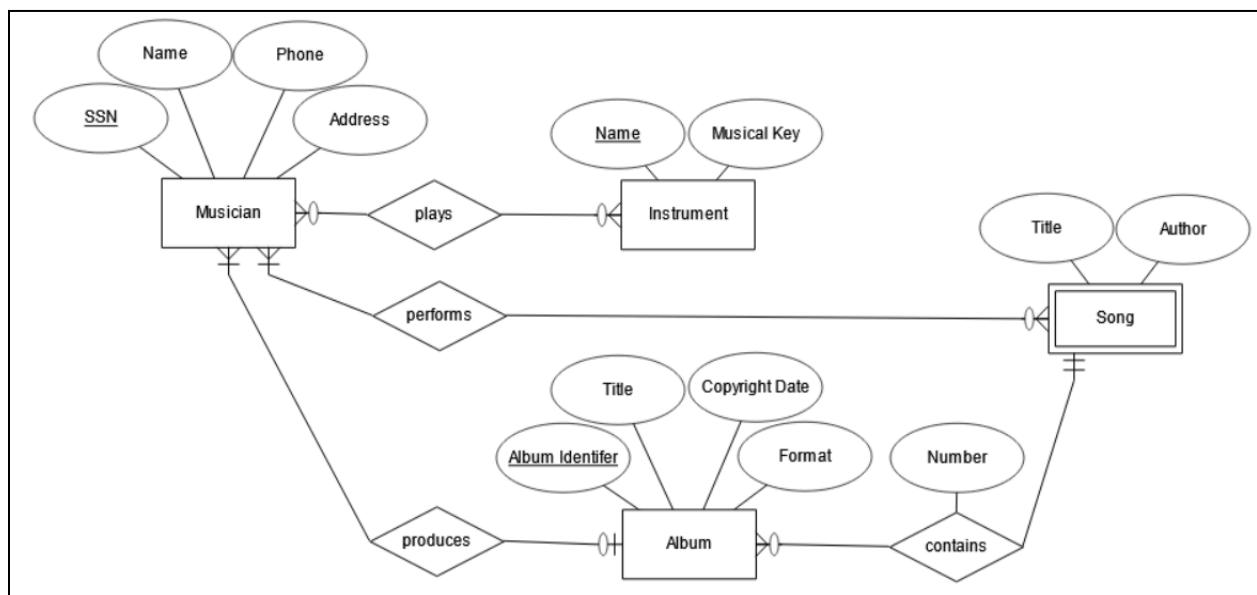
Entities	Attributes
Professor	SSN (primary), Name, Age, Rank, Research Specialty
Project	Number (primary), Sponsor Name, Start Date, End Date, Budget
Graduate Student	SSN (primary), Name, Age, Degree
Department	Number (primary), Name, Office

KEY & RELATIONSHIP CONSTRAINTS

Relationship	Entities (1,2)	Cardinality	Participation (1,2)
Manages	Professor, Project	One to One	Optional, Mandatory
Works On (Professors)	Professor, Project	Many to Many	Optional, Optional
Works On (for Graduate Students)	GraduateStudent, Project	Many to Many	Mandatory, Optional

Supervises	Professor, GraduateStudent	One to Many	Optional, Mandatory
Runs	Professor, Department	One to One	Optional, Mandatory
Works In	Professor, Department	Many to Many	Optional, Optional
Has Major	GraduateStudent, Department	Many to One	Mandatory, Optional
Advises	GraduateStudent to self	One to Many	Optional (for Student Advisor), Mandatory (for GraduateStudent)

1.5 Notown



Address-Phone Constraint: The rule that no address can have more than one phone number is not captured because additional constraints would be required at the database level. Also, a “poor” musician must be clearly defined, requiring additional information about the musician’s finances. One solution could be to relate the musician entity to a separate address entity with a unique phone number attribute.

Unique Song Titles: The ER model cannot express that songs must be unique to a specific album. This constraint would also be enforced at the database level since it is necessary to check if other albums contain the song.

ENTITIES & ATTRIBUTES

<u>Entities</u>	<u>Attributes</u>
Musician	SSN (primary), Name, Phone, Address
Instrument	Name (primary), Musical Key
Song	Title, Author
Album	Album ID (primary), Title, Copyright Date, Format

KEY & RELATIONSHIP CONSTRAINTS

<u>Relationship</u>	<u>Entities (1,2)</u>	<u>Cardinality</u>	<u>Participation (1,2)</u>
plays	Musician, Instrument	Many to Many	Optional, Optional
performs	Musician, Song	Many to Many	Optional, Mandatory
produces	Musician, Album	One to Many	Optional, Mandatory
contains	Album, Song	One to Many	Mandatory, Optional