



SCHOOL OF
MATHEMATICS SCIENCES AND
INFORMATION TECHNOLOGY

NORMALIZATION DATABASE

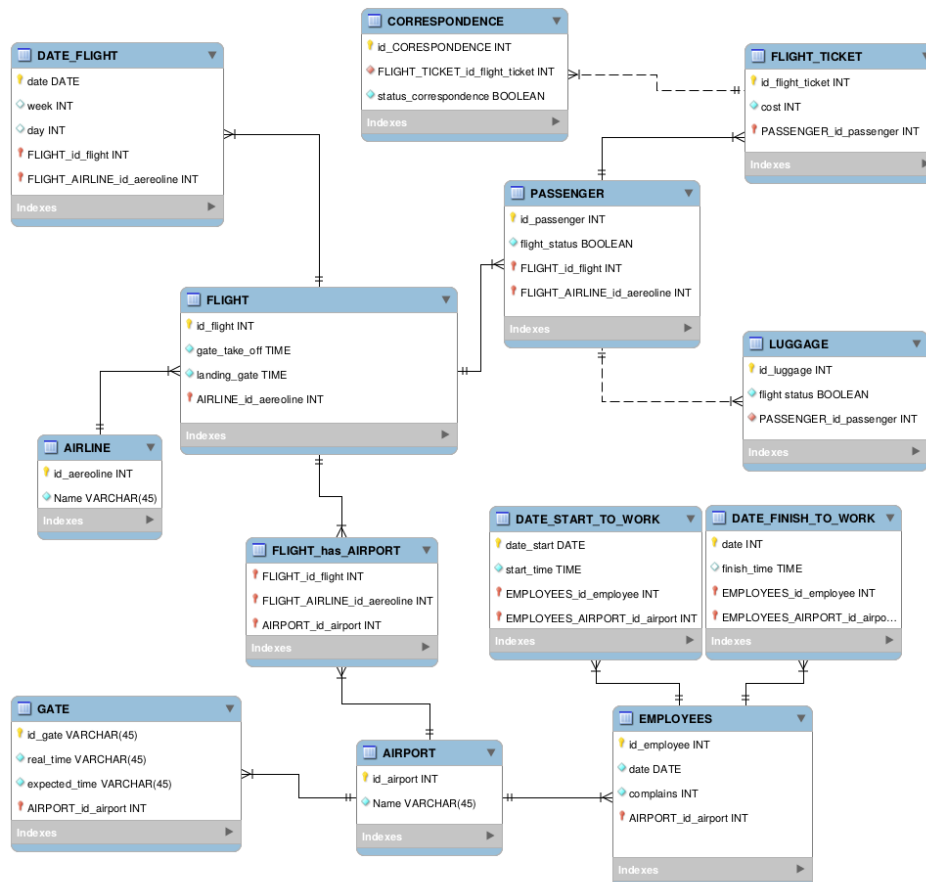
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1 Tables and dependences - Normalization

1.1 Table FLIGHT

Attributes of *FLIGHT*

$$FLIGHT = (\underline{id_flight}, landing_gate, gate_take_off)$$

Functional Dependences of *FLIGHT*

$$\{\underline{id_flight}\} \rightarrow \{landing_gate, gate_take_off\}$$

Note: There are not multivaluate and join dependences.

Normalization of *FLIGHT*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.
- Third normal form:
It fulfills with the third normal form (3NF) because it is in 2FN and any non-key attribute has no transitive dependency on another non-key attribute.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attribute not imply the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.2 Table DATE_FLIGHT

Attributes of *DATE_FLIGHT*

$$DATE_FLIGHT = (\underline{date}, week, day)$$

Functional Dependences of *DATE_FLIGHT*

$$\{\underline{date}\} \rightarrow \{week, day\}$$

Note: There are not multivaluate and join dependences.

Normalization of *DATE_FLIGHT*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.

- Third normal form:
It fulfills with the third normal form (3FN) because it is in 2FN and any non-key attribute has no transitive dependency on another non-key attribute.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attribute not imply the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.3 Table AIRLINE

Attributes of *AIRLINE*

$$AIRLINE = (\underline{id_airline}, name)$$

Functional Dependencies of *AIRLINE*

$$\{\underline{id_airline}\} \rightarrow \{name\}$$

Note: There are not multivaluate and join dependencies.

Normalization of *AIRLINE*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.
- Third normal form:
It fulfills with the third normal form (3FN) because it is in 2FN and any non-key attribute has not transitive dependency on another non-key attribute.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attribute not imply the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because is not in BCNF and it does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.4 Table LUGGAGE

Attributes of *LUGGAGE*

$$LUGGAGE = (\underline{id_luggage}, flight_status)$$

Functional Dependences of *LUGGAGE*

$$\{\underline{id_luggage}\} \rightarrow \{flight_status\}$$

Note: There are not multivaluate and join dependences.

Normalization of *LUGGAGE*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.
- Third normal form:
It fulfills with the third normal form (3FN) because its table is in second normal form and has not transitive dependency.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attribute not imply the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.5 Table DATE_EMPLOYEE

Attributes of *DATE_EMPLOYEE*

$$DATE_EMPLOYEE = (\underline{date}, start_time, finish_time)$$

Multivaluate Dependences of *DATE_EMPLOYEE*

$$\{\underline{date}\} \rightarrow \{start_time\}$$

$$\{\underline{date}\} \rightarrow \{finish_time\}$$

Note: There are not functional dependences and join dependences.

Normalization of *DATE_EMPLOYEE*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.

- Third normal form:
It fulfills with the third normal form (3FN) because its table is in second normal form and has not transitive dependency.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It fulfills with the fourth normal form (4NF) because its table is in BCNF and the primary key has only one multivaluate dependence.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because in spite of the table is in 4NF there are only two attributes.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.6 Table EMPLOYEE

Attributes of *EMPLOYEE*

$$EMPLOYEE = (\underline{id_employee}, date, complains)$$

Functional Dependence of *EMPLOYEE*

$$\{\underline{id_employee}\} \rightarrow \{date, complains\}$$

Note: There are not multivaluate and join dependences.

Normalization of *EMPLOYEE*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.
- Third normal form:
It fulfills with the third normal form (3NF) because its table is in second normal form and has not transitive dependency.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.7 Table PASSENGER

Attributes of *PASSENGER*

$$PASSENGER = (\underline{id_passenger}, flight_status)$$

Functional Dependence of *PASSENGER*

$$\{\underline{id_passenger}\} \rightarrow \{flight_status\}$$

Note: There are not multivaluate and join dependences.

Normalization of *EMPLOYEE*

- First Normal Form:
It is in the first normal form (1NF) because the flight_status attribute contains only atomic values.
- Second Normal Form:
It is in the second normal form (2NF) because the flight_status attribute is completely dependent on the key id_passenger and is also in the first normal form.
- Third normal form:
It is in third normal form (3NF) because there are no attributes that depend transitively of other attributes not key and is also in the second normal form.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is no join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because it is not in 5NF and all non-prime attributes do not change at the same time.

1.8 Table FLIGHT_TICKET

Attributes of *FLIGHT_TICKET*

$$FLIGHT_TICKET = (\underline{id_flight_ticket}, cost)$$

Functional Dependence of *FLIGHT_TICKET*

$$\{\underline{id_flight_ticket}\} \rightarrow \{cost\}$$

Note: There are not multivaluate and join dependences.

Normalization of *FLIGHT_TICKET*

- First Normal Form:
It is in first normal form (1NF) because the values of the field cost are all atomic.
- Second Normal Form:
It is in the second normal form (2NF) because the attribute cost depends completely on the id_flight_ticket.
- Third normal form:
It is in the third normal form (3NF) because the attribute cost not depend transitively on another attribute that is not key.

- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.9 Table CORRESPONDENCE

Attributes of *CORRESPONDENCE*

$$CORRESPONDENCE = (\underline{id_CORRESPONDENCE}, status_correspondence)$$

Functional Dependence of *CORRESPONDENCE*

$$\{\underline{id_CORRESPONDENCE}\} \rightarrow \{status_correspondence\}$$

Note: There are not multivaluate and join dependences.

Normalization of *CORRESPONDENCE*

- First Normal Form:
The field status_correspondence has atomic values therefore it is in the first normal form (1FN).
- Second Normal Form:
It is in the second normal form (2NF) because the attribute status_correspondence depends completely on the key id_CORRESPONDENCE.
- Third normal form:
There are no attributes that depend transitively on another attribute that is not key for which it is in the third normal form(3FN).
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.10 Table AIRPORT

Attributes of *AIRPORT*

$$AIRPORT = (\underline{id_airport}, name)$$

Functional Dependence of *AIRPORT*

$$\{\underline{id_airport}\} \rightarrow \{name\}$$

Note: There are not multivaluate and join dependences.

Normalization of *AIRPORT*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it contains the field name and it is an atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, the only non-key attribute name is completely dependent on the primary key *id_airport*.
- Third normal form:
It fulfills with the third normal form (3FN) because it is in 2FN and any non-key attribute has not transitive dependency on another non-key attribute.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes not implies the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because is not in BCNF and it does not have non-trivial multivalued dependencies.
- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.

1.11 Table GATE

Attributes of *GATE*

$$GATE = (\underline{id_gate}, real_time, expected_time)$$

Functional Dependence of *GATE*

$$\{\underline{id_gate}\} \rightarrow \{real_time, expected_time\}$$

Note: There are not multivaluate and join dependences.

Normalization of *GATE*

- First Normal Form:
It fulfills the requirement of the first normal form (1NF) because it only contains atomic fields.
- Second Normal Form:
It fulfills with the second normal form (2NF) because there are not partial dependencies, in other words, all non-key attributes are completely dependent on the primary key.
- Third normal form:
It fulfills with the third normal form (3FN) because its table is in second normal form and has not transitive dependency.
- Boyce/Codd Normal Form:
It fulfills the Boyce/Codd normal form (BCNF) because its table is in 3NF and the attributes do not imply the primary key.
- Fourth Normal Form
It does not apply with the fourth normal form (4NF) because its table does not have non-trivial multivalued dependencies.

- Fifth Normal Form
It does not apply with the fifth normal form (5NF) because it is not in 4NF and there is not join dependency involved by candidate keys.
- Sixth Normal Form
It fulfills with the sixth normal form (6NF) because all non-prime attributes do not change at the same time.