

## BCNF Normalization (1 of 2)

**Prove:** CTD database is in BCNF. A database schema is in BCNF if each relation schema is in BCNF.

### MANUFACTURER

Name	Phone	<u>Email</u>
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**FD1:** {Email} → {Name, Phone}

∴ Email is a candidate key for MANUFACTURER as it is needed to identify Name, Phone.

**Proof:** Since FD1 has the determinant as a candidate key, this relation is in BCNF.

### ORGANIZATION

Website	Name	Phone	<u>Email</u>
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**FD2:** {Email} → {Website, Name, Phone}

∴ Email is a candidate key for ORGANIZATION as it is needed to identify Website, Name, Phone.

**Proof:** Since FD2 has the determinant as a candidate key, this relation is in BCNF.

### OPERATOR

Fname	Minit	Lname	<u>Email</u>
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**FD3:** {Email} → {Fname, Minit, Lname}

∴ Email is a candidate key for OPERATOR as it is needed to identify Fname, Minit, Lname.

**Proof:** Since FD3 has the determinant as a candidate key, this relation is in BCNF.

### GPS

Name	<u>Latitude</u>	<u>Longitude</u>
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**FD4:** {Latitude, Longitude} → {Name}

∴ Latitude and Longitude is a candidate key for GPS as it is needed to identify Name.

**Proof:** Since FD4 has the determinant as a candidate key, this relation is in BCNF.

### EQUIPMENT

Produce	Register	Name	<u>SKU</u>
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**FD5:** {SKU} → {Produce, Register, Name}

∴ SKU is a candidate key for EQUIPMENT as it is needed to identify Produce, Register, Name.

**Proof:** Since FD5 has the determinant as a candidate key, this relation is in BCNF.

## BCNF Normalization (2 of 2)

EMPLOY

Date	<u>Organization</u>	<u>Operator</u>	
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**FD6:** {Organization, Operator} → {Date}

∴ Organization, Operator is a candidate key for EMPLOY as it is needed to identify Date.

**Proof:** Since FD6 has the determinant as a candidate key, this relation is in BCNF.

MEASUREMENT

Temperature	Transmissivity	Fluorescence	Salinity	Density	Saturation
Pressure	<u>LocateLati</u>	<u>LocateLong</u>	<u>Log</u>	<u>Utilize</u>	<u>Time</u>

**FD7:** {LocateLati, LocateLong, Log, Utilize, Time}

→ {Temperature, Transmissivity, Fluorescence, Salinity, Density, Saturation, Pressure}

∴ LocateLati, LocateLong, Log, Utilize, Time is a candidate key for MEASUREMENT as it is needed to identify Temperature, Transmissivity, Fluorescence, Salinity, Density, Saturation, and Pressure.

**Proof:** Since FD7 has the determinant as a candidate key, this relation is in BCNF.

**Conclusion:** Since all relations are in BCNF, the database CTD is in BCNF.