**ECONOMICAL GROWTH OF WEB 3.0 STARTUPS IN INDIA**



**BTech/II Year CSE/III Semester**

**19CSE202/Database Management Systems**

**Project Review -2**

|  |  |
| --- | --- |
| Roll No | Name |
| CB.EN.U4CSE21117 | **DODDA MANVISH** |
| CB.EN.U4CSE21138 | **NAVUTA SAI SURYA** |
| CB.EN.U4CSE21148 | **CHAITANYA VARMA** |
| CB.EN.U4CSE21166 | **GOUTHAM VELUGURI** |

**Amrita School of Engineering, Coimbatore**

**Department of Computer Science and Engineering**

**2022 -2023 Odd Semester**

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**Company Relation:**

**COMPANY(COMPANY\_ID(primary key)**

**COMPANY\_NAME, YEAR\_ESTABLISHED, COMPANY\_CITY, COMPANY\_CONTACT, GDP\_RANK, GDP\_CONTRIBUTION\_IN\_YEAR\_20-21, GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22, NETWORTH, PREDICTION, MARKET\_VALUE, INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21, INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22, CURRENT\_ASSETS, WORKING\_CAPITAL, CURRENT\_SHARE\_VALUE, GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22, RESEARCH\_BUDGET, TECHNOLOGY\_TYPE, MAIN\_INVESTORES, GOVERNMENT\_INVESTMENT**

**Sample Data:**

|  |  |  |  |
| --- | --- | --- | --- |
| COMPANY\_ID | COMPANY\_NAME | YEAR\_ESTABLISHED | COMPANY\_CITY |
| 9887 | ORIGIN | 2018 | MUMBAI |
| 7868 | WEBCOM | 2019 | CHENNAI |
| 8549 | WOLF NETWORK | 2017 | HYDRABAD |

|  |  |  |
| --- | --- | --- |
| COMPANY\_CONTACT | GDP\_RANK | GDP\_CONTRIBUTION\_IN\_YEAR\_20-21 |
| 8182252030 | 23 | 0.34% |
| 9754285667 | 46 | 2.22% |
| 9182252030 | 10 | 3.23% |

|  |  |  |  |
| --- | --- | --- | --- |
| GDP\_CONTRIBUTION\_IN\_YEAR\_21-22 | NETWORTH | PREDICTION | MARKET\_VALUE |
| 1.34% | 2.3B | 2.45 | 5.6B |
| 1.22% | 5.8B | -1.4 | 3.2B |
| 4.23% | 6.8B | 4.5 | 10.3B |

|  |  |
| --- | --- |
| INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21 | INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22 |
| 9.25% | 8.25% |
| 10.45% | 2.45% |
| 19.23% | 11.23% |

|  |  |  |
| --- | --- | --- |
| CURRENT\_ASSETS | WORKING\_CAPITAL | CURRENT\_SHARE\_VALUE |
| 3.4B | 1.3M | 283 |
| 1.22B | 5.6M | 378 |
| 4B | 2.3B | 636 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| GROWTH\_RATE\_IN\_FY\_19\_20 | GROWTH\_RATE\_IN\_FY\_20\_21 | GROWTH\_RATE\_IN\_FY\_21\_22 |
| 3.02% | 6.02% | 9.00% |
| 2.30% | 4.30% | 2.30% |
| 1.45% | 6.45% | 5.45% |

|  |  |  |  |
| --- | --- | --- | --- |
| RESEARCH\_BUDGET | TECHNOLOGY\_TYPE | MAIN\_INVESTORES | GOVERNMENT\_INVESTMENT |
| 2.3M | WEB3.0 | BILL | 1.2M |
| 5.4M | BLOCKCHAIN | GATES | 3.6M |
| 7.3M | AI | AMBANI | 5.7M |

**KEY: COMPANY\_ID**

**Functional Dependencies (FD):**

1. COMPANY\_ID 🡪 COMPANY\_NAME
2. COMPANY\_ID 🡪 YEAR\_ESTABLISHED
3. COMPANY\_ID 🡪 COMPANY\_CITY
4. COMPANY\_ID 🡪 COMPANY\_CONTACT
5. COMPANY\_ID 🡪 GDP\_RANK
6. COMPANY\_ID 🡪 GDP\_CONTRIBUTION\_IN\_YEAR\_20-21
7. COMPANY\_ID 🡪 GDP\_CONTRIBUTION\_IN\_YEAR\_21-22
8. COMPANY\_ID 🡪 NETWORTH
9. COMPANY\_ID 🡪 PREDICTION
10. COMPANY\_ID 🡪 MARKET\_VALUE
11. COMPANY\_ID 🡪 INFRSTRUCTURE\_GROWTH\_IN\_FY\_20-21
12. COMPANY\_ID 🡪 INFRSTRUCTURE\_GROWTH\_IN\_FY\_21-22
13. COMPANY\_ID 🡪 CURRENT\_ASSETS
14. COMPANY\_ID 🡪 WORKING\_CAPITAL
15. COMPANY\_ID 🡪 CURRENT\_SHARE\_VALUE
16. COMPANY\_ID 🡪 GROWTH\_RATE\_IN\_FY\_19-20
17. COMPANY\_ID 🡪 GROWTH\_RATE\_IN\_FY\_20-21
18. COMPANY\_ID 🡪 GROWTH\_RATE\_IN\_FY\_21-22
19. COMPANY\_ID 🡪 RESEARCH\_BUDGET
20. COMPANY\_ID 🡪 TECHNOLOGY\_TYPE
21. COMPANY\_ID 🡪 MAIN\_INVESTORS
22. COMPANY\_ID 🡪 GOVERNMENT\_INVESTMENT

**FD Closure:**

COMPANY\_ID + 🡪 COMPANY\_ID, COMPANY\_NAME, YEAR\_ESTABLISHED, COMPANY\_CITY, COMPANY\_CONTACT, GDP\_RANK, GDP\_CONTRIBUTION\_IN\_YEAR\_20-21, GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22, NETWORTH, PREDICTION, MARKET\_VALUE, INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21, INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22, CURRENT\_ASSETS, WORKING\_CAPITAL, CURRENT\_SHARE\_VALUE, GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22, RESEARCH\_BUDGET, TECHNOLOGY\_TYPE, MAIN\_INVESTORES, GOVERNMENT\_INVESTMENT

**Attribute Closure:**

{COMPANY\_ID} + 🡪 {COMPANY\_ID, COMPANY\_NAME, YEAR\_ESTABLISHED, COMPANY\_CITY, COMPANY\_CONTACT, GDP\_RANK, GDP\_CONTRIBUTION\_IN\_YEAR\_20-21, GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22, NETWORTH, PREDICTION, MARKET\_VALUE, INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21, INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22, CURRENT\_ASSETS, WORKING\_CAPITAL, CURRENT\_SHARE\_VALUE, GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22, RESEARCH\_BUDGET, TECHNOLOGY\_TYPE, MAIN\_INVESTORES, GOVERNMENT\_INVESTMENT}

{COMPANY\_NAME }+ = {COMPANY\_NAME }

{ YEAR\_ESTABLISHED }+ = { YEAR\_ESTABLISHED }

{COMPANY\_NAME }+ = {COMPANY\_NAME }

{ COMPANY\_CITY }+ = { COMPANY\_CITY }

{ COMPANY\_CONTACT }+ = { COMPANY\_CONTACT }

{COMPANY\_NAME }+ = {COMPANY\_NAME }

{ GDP\_RANK }+ = { GDP\_RANK }

{GDP\_CONTRIBUTION\_IN\_YEAR\_20-21 }+ = {GDP\_CONTRIBUTION\_IN\_YEAR\_20-21}

{ GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22 }+ = { GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22 }

{ NETWORTH }+ = { NETWORTH }

{ PREDICTION }+ = { PREDICTION }

{ MARKET\_VALUE }+ = {MARKET\_VALUE }

{ INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21}+ = { INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21}

{ INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22}+ = { INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22}

{ CURRENT\_ASSETS }+ = { CURRENT\_ASSETS }

{ WORKING\_CAPITAL }+ = { WORKING\_CAPITAL }

{ CURRENT\_SHARE\_VALUE }+ = {CURRENT\_SHARE\_VALUE }

{ GROWTH\_RATE\_IN\_FY\_19\_20}+ = {GROWTH\_RATE\_IN\_FY\_19\_20}

{ GROWTH\_RATE\_IN\_FY\_20\_21}+ = { GROWTH\_RATE\_IN\_FY\_20\_21}

{ GROWTH\_RATE\_IN\_FY\_21\_22}+ = {GROWTH\_RATE\_IN\_FY\_21\_22}

{RESEARCH\_BUDGET}+ = { RESEARCH\_BUDGET }

{ TECHNOLOGY\_TYPE }+ = { TECHNOLOGY\_TYPE }

{ MAIN\_INVESTORES }+ = { MAIN\_INVESTORES }

{ GOVERNMENT\_INVESTMENT }+ = { GOVERNMENT\_INVESTMENT }

**CANONICAL COVER:**

COMPANY\_ID 🡪 COMPANY\_ID, COMPANY\_NAME, YEAR\_ESTABLISHED, COMPANY\_CITY, COMPANY\_CONTACT, GDP\_RANK, GDP\_CONTRIBUTION\_IN\_YEAR\_20-21, GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22, NETWORTH, PREDICTION, MARKET\_VALUE, INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21, INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22, CURRENT\_ASSETS, WORKING\_CAPITAL, CURRENT\_SHARE\_VALUE, GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22, RESEARCH\_BUDGET, TECHNOLOGY\_TYPE, MAIN\_INVESTORES, GOVERNMENT\_INVESTMENT

**1NF**

The conditions for 1NF are:

1. The relation must have a primary key.
2. The relation must only store atomic values.
3. The relation must not have any similar columns [columns storing similar information].

The relation COMPANY has a primary key –COMPANY\_ID, which satisfies the first condition.

All the attributes in the relation store atomic values, which satisfies the second condition.

But the relation has similar columns. The similar columns are:

1. GDP\_CONTRIBUTION\_IN\_YEAR\_20-21, GDP\_CONTRIBUTION\_IN\_YEAR\_21- 22
2. INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21, INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22
3. GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22

**“This table did not have any anomalies”**

But we need to convert this table into First normal form so

New table will be

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| COMPANY\_ID | COMPANY\_NAME | YEAR\_ESTABLISHED | COMPANY\_CITY | COMPANY\_CONTACT |
| 9887 | ORIGIN | 2018 | MUMBAI | 8182252030 |
| 7868 | WEBCOM | 2019 | CHENNAI | 9754285667 |
| 8549 | WOLF NETWORK | 2017 | HYDRABAD | 9182252030 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| GDP\_RANK | NETWORTH | PREDICTION | MARKET\_VALUE | CURRENT\_ASSETS | WORKING\_CAPITAL |
| 23 | 2.3B | 2.45 | 5.6B | 3.4B | 1.3M |
| 46 | 5.8B | -1.4 | 3.2B | 1.22B | 5.6M |
| 10 | 6.8B | 4.5 | 10.3B | 4B | 2.3B |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CURRENT\_SHARE\_VALUE | RESEARCH\_BUDGET | TECHNOLOGY\_TYPE | MAIN\_INVESTORES | GOVERNMENT\_INVESTMENT |
| 283 | 2.3M | WEB3.0 | BILL | 1.2M |
| 378 | 5.4M | BLOCKCHAIN | GATES | 3.6M |
| 636 | 7.3M | AI | AMBANI | 5.7M |

**GROWTH TABLE**

|  |  |  |
| --- | --- | --- |
| COMPANY\_ID | GDP\_CONTRIBUTION\_IN\_YEAR\_20-21 | GDP\_CONTRIBUTION\_IN\_YEAR\_21-22 |
| 9887 | 0.34% | 1.34% |
| 7868 | 2.22% | 1.22% |
| 8549 | 3.23% | 4.23% |

|  |  |  |
| --- | --- | --- |
| INFRASTRUCTURE\_GROWTH\_FY\_20-21 | INFRASTRUCTURE\_GROWTH\_FY\_21-22 | GROWTH\_RATE\_IN\_FY\_19\_20 |
| 9.25% | 8.25% | 3.02% |
| 10.45% | 2.45% | 2.30% |
| 19.23% | 11.23% | 1.45% |

|  |  |
| --- | --- |
| GROWTH\_RATE\_IN\_FY\_20\_21 | GROWTH\_RATE\_IN\_FY\_21\_22 |
| 6.02% | 9.00% |
| 4.30% | 2.30% |
| 6.45% | 5.45% |

Since Similar columns are present in will move them into new table

New table will be

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| COMPANY\_ID | COMPANY\_NAME | YEAR\_ESTABLISHED | COMPANY\_CITY | COMPANY\_CONTACT |
| 9887 | ORIGIN | 2018 | MUMBAI | 8182252030 |
| 7868 | WEBCOM | 2019 | CHENNAI | 9754285667 |
| 8549 | WOLF NETWORK | 2017 | HYDRABAD | 9182252030 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| GDP\_RANK | NETWORTH | PREDICTION | MARKET\_VALUE | CURRENT\_ASSETS | WORKING\_CAPITAL |
| 23 | 2.3B | 2.45 | 5.6B | 3.4B | 1.3M |
| 46 | 5.8B | -1.4 | 3.2B | 1.22B | 5.6M |
| 10 | 6.8B | 4.5 | 10.3B | 4B | 2.3B |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CURRENT\_SHARE\_VALUE | RESEARCH\_BUDGET | TECHNOLOGY\_TYPE | MAIN\_INVESTORES | GOVERNMENT\_INVESTMENT |
| 283 | 2.3M | WEB3.0 | BILL | 1.2M |
| 378 | 5.4M | BLOCKCHAIN | GATES | 3.6M |
| 636 | 7.3M | AI | AMBANI | 5.7M |

**GDP TABLE**

|  |  |  |
| --- | --- | --- |
| COMPANY\_ID | GDP\_CONTRIBUTION\_IN\_YEAR\_20-21 | GDP\_CONTRIBUTION\_IN\_YEAR\_21-22 |
| 9887 | 0.34% | 1.34% |
| 7868 | 2.22% | 1.22% |
| 8549 | 3.23% | 4.23% |

**INFRASTRUCTURE TABLE**

|  |  |  |
| --- | --- | --- |
| COMPANY\_ID | INFRASTRUCTURE\_GROWTH\_IN\_FY\_20-21 | INFRASTRUCTURE\_GROWTH\_IN\_FY\_21-22 |
| 9887 | 9.25% | 8.25% |
| 7868 | 10.45% | 2.45% |
| 8549 | 19.23% | 11.23% |

**GROWTH TABLE**

|  |  |  |
| --- | --- | --- |
| COMPANY\_ID | GROWTH\_RATE\_IN\_FY\_19\_20 | GROWTH\_RATE\_IN\_FY\_20\_21 |
| 9887 | 3.02% | 6.02% |
| 7868 | 2.30% | 4.30% |
| 8549 | 1.45% | 6.45% |

|  |
| --- |
| GROWTH\_RATE\_IN\_FY\_21\_22 |
| 9.00% |
| 2.30% |
| 5.45% |

Now,

**1NF:** The decomposed relations meet the requirements for 1NF.

**2NF:**

For the relation to be in 2NF, it must not have any partial dependencies. When A 🡪 B, and B is functionally dependent on A, but B can also be determined by any other proper subset of A, then A 🡪 B is a partial dependency.

**2NF:** The decomposed relations meet the requirements for 2NF.

**3NF:**

For the relation to be in 3NF, it must not have any transitive dependencies. A functional dependency in a database is an indirect relationship between values in the same table that causes a functional dependency. It occurs when the value of a non-key attribute is functionally dependent on the value of another non-key attribute.

**3NF:** The decomposed relations meet the requirements for 3NF.

**BCNF:**

For the relation to be in BCNF, it must already be in 3NF. For every functional dependency X 🡪 Y, X must be a super key.

**BCNF:** The decomposed relations meet the requirements for BCNF.

**The decomposed relations are:**

**COMPANY TABLE:**

COMPANY\_ID(KEY), COMPANY\_NAME, YEAR\_ESTABLISHED, COMPANY\_CITY, COMPANY\_CONTACT, GDP\_RANK, NETWORTH, PREDICTION, MARKET\_VALUE, CURRENT\_ASSETS, WORKING\_CAPITAL, CURRENT\_SHARE\_VALUE, RESEARCH\_BUDGET, TECHNOLOGY\_TYPE, MAIN\_INVESTORES, GOVERNMENT\_INVESTMENT

**GDP TABLE**

COMPANY\_ID(KEY), GDP\_CONTRIBUTION\_IN\_YEAR\_2021,GDP\_CONTRIBUTION\_IN\_YEAR\_21-22

**INFRASTRUCTRE TABLE**

COMPANY\_ID, INFRASTRUCTURE\_GROWTH\_IN\_FY\_2021,INFRASTRUCTURE\_GROWTH\_IN\_FY\_21

**GROWTH TABLE**

COMPANY\_ID, GROWTH\_RATE\_IN\_FY\_19\_20, GROWTH\_RATE\_IN\_FY\_20\_21, GROWTH\_RATE\_IN\_FY\_21\_22