Problem 1

* 1. **ASSUMING THE 26 is a typo in the table therefore the table is updated as follows. This therefore presumes that JOB\_CHG\_HOUR is dependent on JOB\_CODE**
  2. Raw Table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PROJ\_NUM** | **PROJ\_NAME** | **EMP\_NUM** | **EMP\_NAME** | **JOB\_CODE** | **JOB\_CHG\_HOUR** | **PROJ\_HOURS** | **EMP\_PHONE** |
| 1 | Hurricane | 101 | John D. Newson | EE | 85.0000 | 13.3 | 653-234-3245 |
| 1 | Hurricane | 105 | David F. Schwann | CT | 60.0000 | 16.2 | 653-234-1123 |
| 1 | Hurricane | 110 | Anne R. Ramoras | CT | 60.0000 | 14.3 | 615-233-5568 |
| 2 | Coast | 101 | John D. Newson | EE | 85.0000 | 19.8 | 653-234-3245 |
| 2 | Coast | 108 | June H. Sattlemeir | EE | 85.0000 | 17.5 | 905-554-78.12 |
| 3 | Satellite | 110 | Anne R. Ramoras | CT | 62.0000 | 11.6 | 615-233-5568 |
| 3 | Satellite | 105 | David F. Schwann | CT | **62.0000** | 23.4 | 653-234-1123 |
| 3 | Satellite | 123 | Mary D. Chen | EE | 85.0000 | 19.1 | 615-233-5432 |
| 3 | Satellite | 112 | Allecia R. Smith | BE | 85.0000 | 20.7 | 615-678-6879 |

* 1. Table is already in NF1. No change needed to get table into NF1.
  2. Identify Functional Dependencies
     1. PROJ\_NUM -> PROJ\_NAME
     2. EMP\_NUM -> EMP\_NAME ,JOB\_CODE, EMP\_PHONE
     3. PROJ\_NUM, JOB\_CODE ->JOB\_CODE\_CHG
     4. PROJ\_NUM, EMP\_NUM -> PROJ\_HOURS
  3. Therefore the full NF3 tables are:

|  |
| --- |
| PROJECTS |
| |  |  | | --- | --- | | **PROJ\_NUM** | **PROJ\_NAME** | | 1 | Hurricane | | 2 | Coast | | 3 | Satellite | |
| EMPLOYEES |
| |  |  |  |  | | --- | --- | --- | --- | | **EMP\_NUM** | **EMP\_NAME** | **JOB\_CODE** | **EMP\_PHONE** | | 101 | John D. Newson | EE | 653-234-3245 | | 105 | David F. Schwann | CT | 653-234-1123 | | 110 | Anne R. Ramoras | CT | 615-233-5568 | | 108 | June H. Sattlemeir | EE | 905-554-78.12 | | 123 | Mary D. Chen | EE | 615-233-5432 | | 112 | Allecia R. Smith | BE | 615-678-6879 | |

|  |
| --- |
| PROJECT\_HOURS |
| |  |  |  | | --- | --- | --- | | **PROJ\_NUM** | **EMP\_NUM** | **PROJ\_HOURS** | | 1 | 101 | 13.3 | | 1 | 105 | 16.2 | | 1 | 110 | 14.3 | | 2 | 101 | 19.8 | | 2 | 108 | 17.5 | | 3 | 110 | 11.6 | | 3 | 105 | 23.4 | | 3 | 123 | 19.1 | | 3 | 112 | 20.7 | |

|  |
| --- |
| PROJECT\_RATES |
| |  |  |  | | --- | --- | --- | | **PROJ\_NUM** | **JOB\_CODE** | **JOB\_CHG\_HOUR** | | 1 | EE | 85.0000 | | 1 | CT | 60.0000 | | 2 | EE | 85.0000 | | 3 | CT | 62.0000 | | 3 | EE | 85.0000 | | 3 | BE | 85.0000 | |

Problem 2

* 1. Raw Table: (some data is truncated for ease in duplication here - this does not impact the normalization analysis to follow):

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **id** | **full\_name** | **enabled** | **last\_login** | **title** | **author** | **published\_date** | **Isbn** | **checkout\_date** | **return\_date** |
| 1 | John Smith | f | 2017-10-25 10:26:10 | My First SQL book | Mary Parker | 2012-0222 | 981483029127 | 2107-10-15 14:43 |  |
| 1 | John Smith | f | 2017-10-25 10:26:10 | My Second SQL book | John Mayer | 1972-07-03 | 857300923713 | 2017-10-05 16:22 | 2017-10-13 13:05 |
| 2 | Alice Walker | t | 2017-10-25 10:26:50 | My Second SQL book | John Mayer | 1972-07-03 | 857300923713 | 2017-10-15 11:11 | 2017-10-22 17:47 |
| 3 | Harry Potter | t | 2017-10-25 10:26:50 |  |  |  |  |  |  |
| 5 | Jane Smith | t | 2017-10-25 10:36:43 | My Third SQL book | Cary Flint | 2015-10-18 | 523120967812 | 2017-10-15 09:27 |  |

* 1. Table is already in NF1. No change needed to get table into NF1.
  2. Identify Functional Dependencies
     1. id -> full\_name, enabled, last\_login
     2. isbn-> title, author, published\_date
     3. isbn, checkout\_date -> id, return\_date
  3. Therefore, full NF3 tables are:

|  |
| --- |
| BOOKS |
| |  |  |  |  | | --- | --- | --- | --- | | **Isbn** | **title** | **author** | **published\_date** | | 981483029127 | My First SQL book | Mary Parker | 2012-0222 | | 857300923713 | My Second SQL book | John Mayer | 1972-07-03 | | 857300923713 | My Second SQL book | John Mayer | 1972-07-03 | | 523120967812 | My Third SQL book | Cary Flint | 2015-10-18 | |
| PATRONS |
| |  |  |  |  | | --- | --- | --- | --- | | **id** | **full\_name** | **enabled** | **last\_login** | | 1 | John Smith | f | 2017-10-25 10:26:10 | | 2 | Alice Walker | t | 2017-10-25 10:26:50 | | 3 | Harry Potter | t | 2017-10-25 10:26:50 | | 5 | Jane Smith | t | 2017-10-25 10:36:43 | |

|  |
| --- |
| CHECKOUT\_TRANSACTIONS |
| |  |  |  |  | | --- | --- | --- | --- | | **Isbn** | **checkout\_date** | **id** | **return\_date** | | 981483029127 | 2107-10-15 14:43 | 1 |  | | 857300923713 | 2017-10-05 16:22 | 1 | 2017-10-13 13:05 | | 857300923713 | 2017-10-15 11:11 | 2 | 2017-10-22 17:47 | | 523120967812 | 2017-10-15 09:27 | 5 |  | |

Problem 3

* 1. Raw Table:

|  |  |  |
| --- | --- | --- |
| **branchNo** | **branchAddress** | **teNos** |
| B001 | 8 Jefferson Way, Portland, OR 97201 | 503-555-3618 ,503-555-2727, 503-555-6534 |
| B002 | City Center Plaza, Seattle, WA 98122 | 206-555-6756, 206-555-8836 |
| B003 | 14-8th Avenue, New York, NY 10012 | 212-371-3000 |
| B004 | 16-14th Avenue, Seattle, WA 98128 | 206-555-3131, 206-555-4112 |

* 1. NF1 (intermediate table)

|  |  |  |
| --- | --- | --- |
| **branchNo** | **branchAddress** | **telNos** |
| B001 | 8 Jefferson Way, Portland, OR 97201 | 503-555-3618 |
| B001 | 8 Jefferson Way, Portland, OR 97201 | 503-555-2727 |
| B001 | 8 Jefferson Way, Portland, OR 97201 | 503-555-6534 |
| B002 | City Center Plaza, Seattle, WA 98122 | 206-555-6756 |
| B002 | City Center Plaza, Seattle, WA 98122 | 206-555-8836 |
| B003 | 14-8th Avenue, New York, NY 10012 | 212-371-3000 |
| B004 | 16-14th Avenue, Seattle, WA 98128 | 206-555-3131 |
| B004 | 16-14th Avenue, Seattle, WA 98128 | 206-555-4112 |

* 1. Identify Functional Dependencies:
     1. branchNo -> branchAddress
     2. branchNo, telNox -> branchAddress
  2. Therefore, full NF3 tables are:

|  |
| --- |
| BRANCH\_ADDRESSES |
| |  |  | | --- | --- | | **branchNo** | **branchAddress** | | B001 | 8 Jefferson Way, Portland, OR 97201 | | B002 | City Center Plaza, Seattle, WA 98122 | | B003 | 14-8th Avenue, New York, NY 10012 | | B004 | 16-14th Avenue, Seattle, WA 98128 | |
| BRANCH\_TELEPHONES |
| |  |  | | --- | --- | | **branchNo** | **telNos** | | B001 | 503-555-3618 | | B001 | 503-555-2727 | | B001 | 503-555-6534 | | B002 | 206-555-6756 | | B002 | 206-555-8836 | | B003 | 212-371-3000 | | B004 | 206-555-3131 | | B004 | 206-555-4112 | |

Problem 4

1. Raw Table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| staffNo | branchNo | branchAddress | name | position | hoursPerWeek | telNos |
| S4555 | B002 | City Centre Plaza, Seattle, WA 98122 | Ellen Layman | Assistant | 16 | 503-555-3618,503-555-2727,503-555-6534 |
| S4555 | B004 | 16-14th Avenue, Seattle, WA 98128 | Ellen Layman | Assistant | 9 | 206-555-6756,206-555-8836 |
| S4612 | B002 | City Centre Plaza, Seattle, WA 98122 | Dave Sinclair | Assistant | 14 | 212-317-3000 |
| S4612 | B004 | 16-14th Avenue, Seattle, WA 98128 | Dave Sinclair | Assistant | 10 | 206-555-3131,206-555-4112 |

1. NF1:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| staffNo | branchNo | branchAddress | name | position | hoursPerWeek | telNos |
| S4555 | B002 | City Centre Plaza, Seattle, WA 98122 | Ellen Layman | Assistant | 16 | 503-555-3618 |
| S4555 | B002 | City Centre Plaza, Seattle, WA 98122 | Ellen Layman | Assistant | 16 | 503-555-2727 |
| S4555 | B002 | City Centre Plaza, Seattle, WA 98122 | Ellen Layman | Assistant | 16 | 503-555-6534 |
| S4555 | B004 | 16-14th Avenue, Seattle, WA 98128 | Ellen Layman | Assistant | 9 | 206-555-6756 |
| S4555 | B004 | 16-14th Avenue, Seattle, WA 98128 | Ellen Layman | Assistant | 9 | 206-555-8836 |
| S4612 | B002 | City Centre Plaza, Seattle, WA 98122 | Dave Sinclair | Assistant | 14 | 212-317-3000 |
| S4612 | B004 | 16-14th Avenue, Seattle, WA 98128 | Dave Sinclair | Assistant | 10 | 206-555-3131 |
| S4612 | B004 | 16-14th Avenue, Seattle, WA 98128 | Dave Sinclair | Assistant | 10 | 206-555-4112 |

1. Identify Functional Dependencies:
   1. staffNo -> name,possition
   2. branchNo, telNox -> branchAddress
   3. branchNo -> branchAddress
   4. staffNo, branchNo -> hoursPerWeek
2. Therefore, the full NF3 tables are:

|  |
| --- |
| STAFF |
| |  |  |  | | --- | --- | --- | | **staffNo** | name | position | | S4555 | Ellen Layman | Assistant | | S4612 | Dave Sinclair | Assistant | |
| BRANCH\_ADDRESSES |
| |  |  | | --- | --- | | **branchNo** | branchAddress | | B002 | City Centre Plaza, Seattle, WA 98122 | | B004 | 16-14th Avenue, Seattle, WA 98128 | |

|  |
| --- |
| BRANCH\_TELEPHONES |
| |  |  | | --- | --- | | **branchNo** | **telNos** | | B002 | 503-555-3618 | | B002 | 503-555-2727 | | B002 | 503-555-6534 | | B004 | 206-555-6756 | | B004 | 206-555-8836 | | B002 | 212-317-3000 | | B004 | 206-555-3131 | | B004 | 206-555-4112 | |
| LOCATION\_STAFFING |
| |  |  |  | | --- | --- | --- | | **staffNo** | **branchNo** | hoursPerWeek | | S4555 | B002 | 16 | | S4555 | B004 | 9 | | S4612 | B002 | 14 | | S4612 | B004 | 10 | |

Problem 5

1. Raw Table:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MEMBER\_NUM** | **MEMBER\_NAME** | **MEMBER\_ADDRESS** | **DINNER\_NUM** | **DINNER\_DATE** | **VENUE\_CODE** | **VENUE\_DESCRIPTION** | **FOOD\_CODE** | **FOOD\_DESCRIPTION** |
| 214 | Peter Wong | 325 Meadow Park | D0001 | 15-Mar-10 | B01 | Grand Ball Room | EN3 | Stuffed crab |
| 214 | Peter Wong | 325 Meadow Park | D0001 | 15-Mar-10 | B01 | Grand Ball Room | DE8 | Chocolate mousse |
| 235 | Mary Lee | 123 Rose Court | D0002 | 15-Mar-10 | B02 | Petit Ball Room | EN5 | Marinated steak |
| 235 | Mary Lee | 123 Rose Court | D0002 | 15-Mar-10 | B02 | Petit Ball Room | DE8 | Chocolate mousse |
| 250 | Peter Wong | 9 Nine Ave | D0003 | 20-Mar-10 | C01 | Café | SO1 | Pumpkin soup |
| 250 | Peter Wong | 9 Nine Ave | D0003 | 20-Mar-10 | C01 | Café | EN5 | Marinated steak |
| 250 | Peter Wong | 9 Nine Ave | D0003 | 20-Mar-10 | C01 | Café | DE2 | Apple pie |
| 235 | Mary Lee | 123 Rose Court | D0003 | 20-Mar-10 | C01 | Café | SO1 | Pumpkin soup |
| 235 | Mary Lee | 123 Rose Court | D0003 | 20-Mar-10 | C01 | Café | EN5 | Marinated steak |
| 235 | Mary Lee | 123 Rose Court | D0003 | 20-Mar-10 | C01 | Café | DE2 | Apple pie |
| 300 | Paul Lee | 123 Rose Court | D0004 | 20-Mar-10 | E10 | Petit Ball Room | SA2 | Apple pie |

1. Identify Functional Dependencies:
   1. MEMBER\_NUM -> MEMBER\_NAME, MEMBER\_ADDRESS
   2. DINNER\_NUM -> DINNER DATE,VENUE\_CODE
   3. FOOD\_CODE -> FOOD\_DESCRIPTION
   4. VENUE\_CODE -> VENUE\_DESCRIPTOIN
   5. DINNER\_NUM,MEMBER\_NUM,FOOD\_CODE -> all others
2. Therefore, the NF3 tables are:

|  |
| --- |
| MEMBERS |
| |  |  |  | | --- | --- | --- | | **MEMBER\_NUM** | **MEMBER\_NAME** | **MEMBER\_ADDRESS** | | 214 | Peter Wong | 325 Meadow Park | | 235 | Mary Lee | 123 Rose Court | | 250 | Peter Wong | 9 Nine Ave | | 300 | Paul Lee | 123 Rose Court | |
| DINNERS |
| |  |  |  | | --- | --- | --- | | **DINNER\_NUM** | **DINNER\_DATE** | **VENUE\_CODE** | | D0001 | 15-Mar-10 | B01 | | D0002 | 15-Mar-10 | B02 | | D0003 | 20-Mar-10 | C01 | | D0004 | 20-Mar-10 | E10 | |

|  |
| --- |
| FOODS |
| |  |  | | --- | --- | | **FOOD\_CODE** | **FOOD\_DESCRIPTION** | | EN3 | Stuffed crab | | DE8 | Chocolate mousse | | EN5 | Marinated steak | | SO1 | Pumpkin soup | | DE2 | Apple pie | | SA2 | Apple pie | |

|  |
| --- |
| DISHES\_ORDERED |
| |  |  |  | | --- | --- | --- | | **MEMBER\_NUM** | **DINNER\_NUM** | **FOOD\_CODE** | | 214 | D0001 | EN3 | | 214 | D0001 | DE8 | | 235 | D0002 | EN5 | | 235 | D0002 | DE8 | | 250 | D0003 | SO1 | | 250 | D0003 | EN5 | | 250 | D0003 | DE2 | | 235 | D0003 | SO1 | | 235 | D0003 | EN5 | | 235 | D0003 | DE2 | | 300 | D0004 | SA2 | |

|  |
| --- |
| VENUES |
| |  |  | | --- | --- | | **VENUE\_CODE** | **VENUE\_DESCRIPTION** | | B01 | Grand Ball Room | | B02 | Petit Ball Room | | C01 | Café | | E10 | Petit Ball Room | |