PROJECT#2

DATABASE SYSTEMS – CSE 5330

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PART 1 & 2

TEAM

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DOCUMENTATION

ENTITY TYPES

1. MEMBERS
2. BOOK
3. STAFF

RELATIONSHIP TYPES

1. ISSUE_CARD
2. ISSUE_NOTICE
3. ISSUE_BOOK
4. GET_DESCRIPTION

IDENTIFICATION

1. Every other entity is uniquely identified by its primary key which can be seen from the relational schema diagram.
2. The following entities are represented with their primary keys underlined, and foreign keys by italic style.

- BOOK (*book_key*, title, author, subject)
- BOOK_INFORMATION (*book_key, isbn*, language, binding)
- BOOK_AVAILABILITY (*id*, book_key, copies_available, in_stock, rental_eligible, rented_copies, books_on_loan)
- BOOK_ISSUED_DETAILS (*receipt_no*, *book_key*, issued_book_id, date_issued, lend_type, grace_period, time_issued_to_return, *issued_to_member*, *issued_by_staff*)
- STAFF (*designation_id* , *ssn*, name)
- STAFF_DESIGNATION (*designation_id*, designation_type, designation_power)
- MEMBER (*ssn*, phone_no, address, campus_id, comments)
- LIBRARY_CARD (*ssn*, expiry_date, notice_comments)

AGGREGATION

1. All entities are aggregation of component attributes as seen from the EER diagram.
2. Relation types that have member attributes, is also an example aggregation.

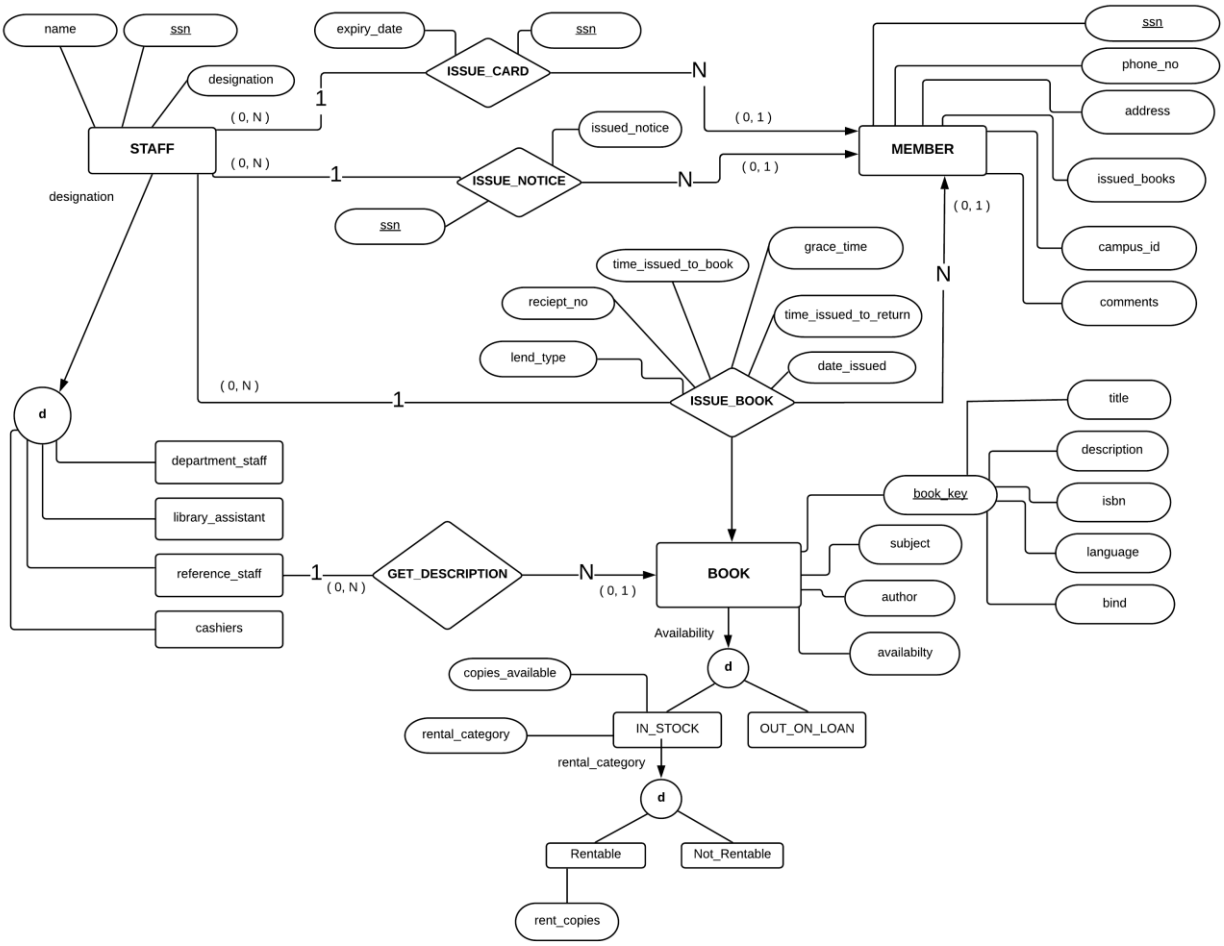
SPECIALIZATION / GENERALIZATION

1. The Books have been specialized to in_stock, and on_loan on the basis of its availability. . This would be a total disjoint specialization.
2. In_stock is further specialized to rentable or not_rentable on the basis of its rental_category. This would be a total disjoint specialization.
3. The Staff is classified/ specialized on the basis of its designation. This would be a partial disjoint specialization.

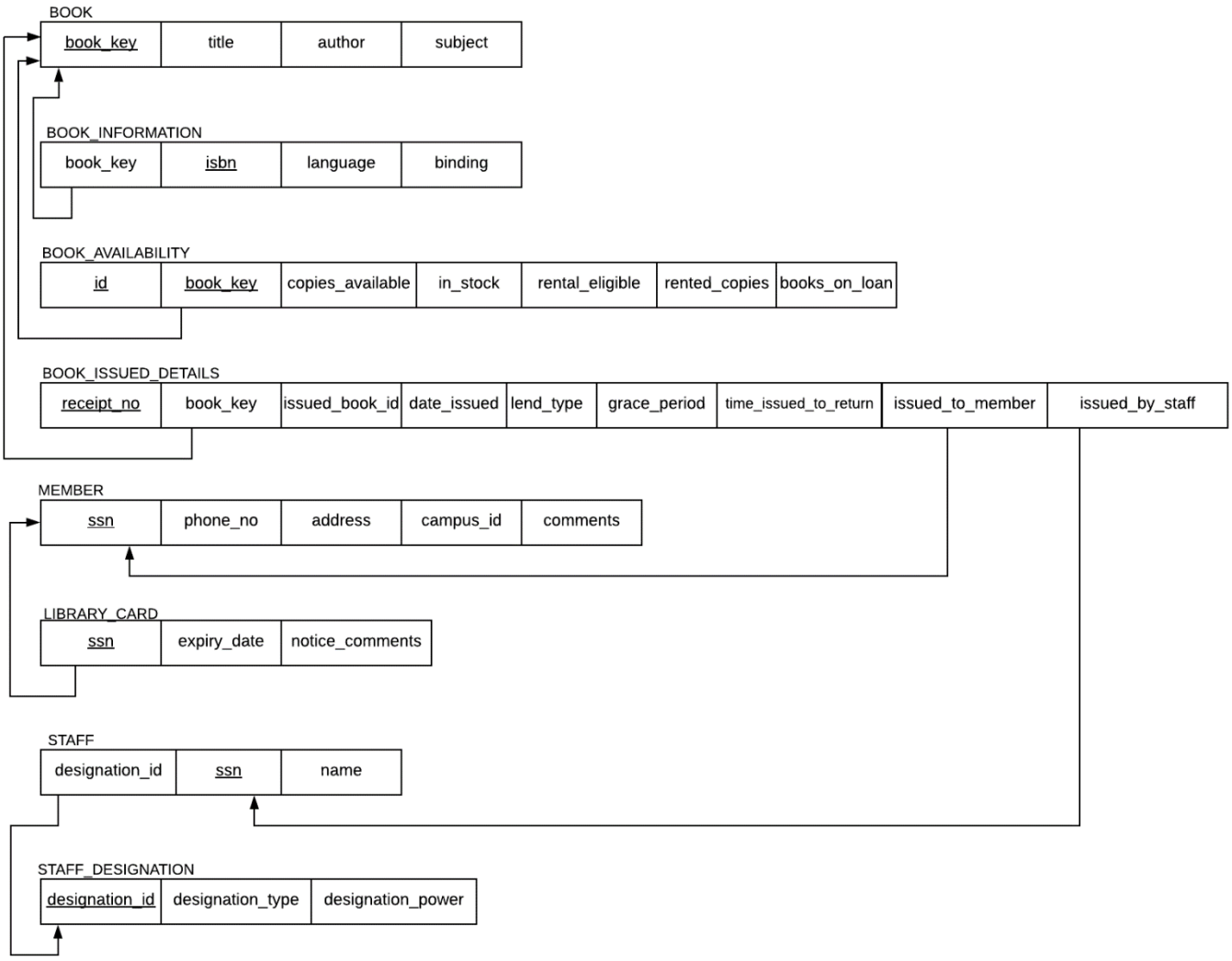
ASSUMPTIONS

1. We assumed that all books borrowed are kept as loan
2. There might be many number of books that have same isbn.
3. Reference Librarians have the power to access description of books, and not other designation_staff.
4. Every library card has a notice attached to it.
5. Every Member has a comment attached to her/ his account.

EER DIAGRAM

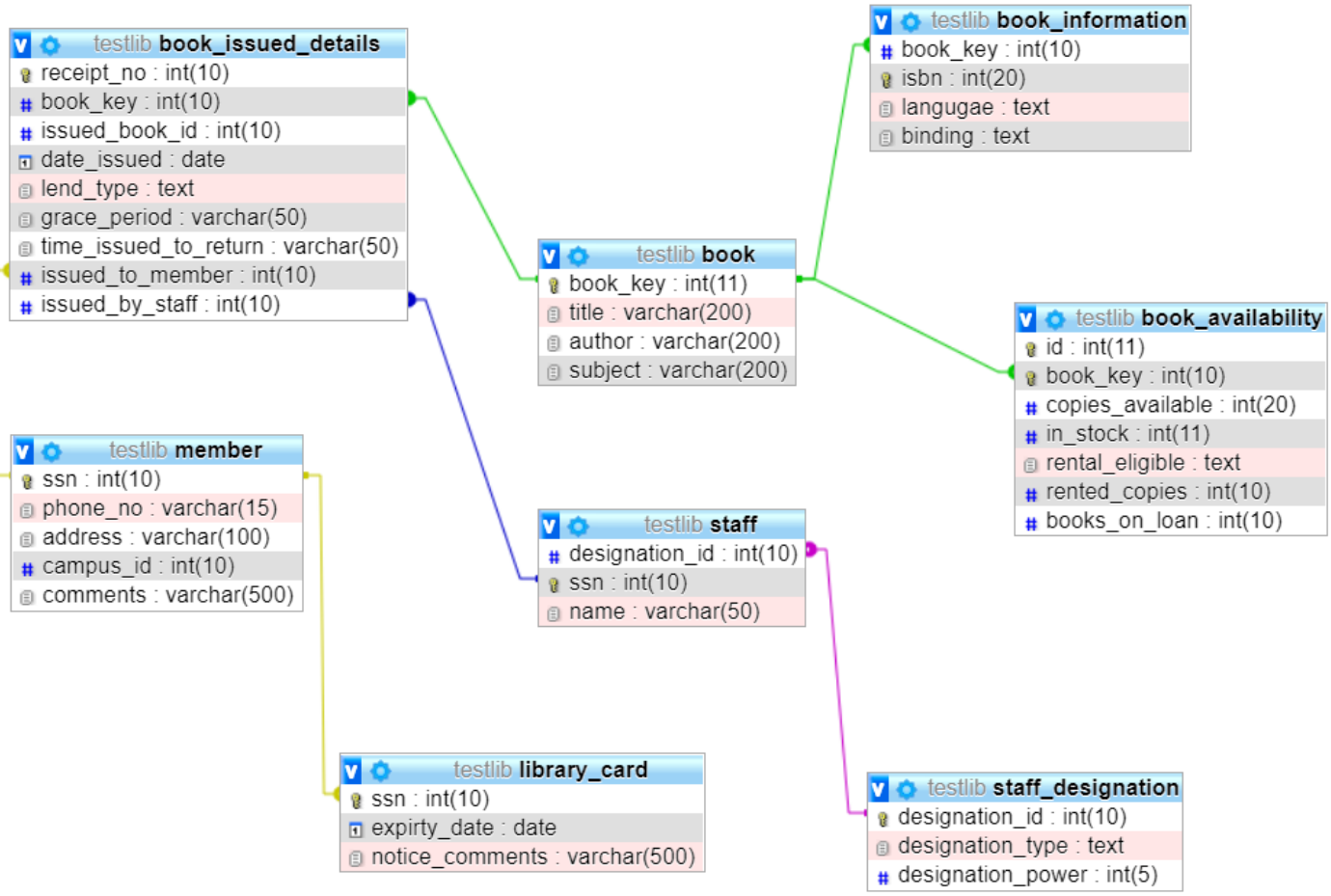


EER-to-RELATIONAL MAPPING



Here, all the primary keys are referenced with an arrow pointed towards itself. All the foreign keys are depicted by a line pointing straight.

RELATIONAL SCHEMA DIAGRAM



SQL SCHEMA

1. **Table structure for table `book`**

```
CREATE TABLE `book` (
`book_key` int(11) NOT NULL,
`title` varchar(200) NOT NULL,
`author` varchar(200) NOT NULL,
`subject` varchar(200) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

book_key	title	author	subject
121	Purus Maecenas Libero	Declan Evans	Fiction
122	Nisi Mauris	Micah Bauer	Amet Literature
123	Tincidunt Congue Turpis	Austin Rivera	Mystery
124	Porttitor Scelerisque	Nasim Sandoval	Romance
125	Vitae Erat Vivamus	Byron Mack	Science
126	Sem War	Silas Reynolds	History
127	Elit Nulla	Bradley Stanley	Law

2. **Table structure for table `book_availability`**

```
CREATE TABLE `book_availability` (
`id` int(11) NOT NULL,
`book_key` int(10) DEFAULT 0,
`copies_available` int(20) NOT NULL,
`in_stock` int(11) NOT NULL,
`rental_eligible` text NOT NULL,
`rented_copies` int(10) NOT NULL,
`books_on_loan` int(10) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

id	book_key	copies_available	in_stock	rental_eligible	rented_copies	books_on_loan
1	121	3	5	false	2	0
2	122	2	5	true	0	3
3	123	2	4	true	1	1
4	124	3	6	true	0	3
5	125	6	7	false	1	0
6	126	7	8	false	1	0
7	127	5	6	false	0	1

3. **Table structure for table `book_information`**

```
CREATE TABLE `book_information` (
  `book_key` int(10) DEFAULT 1,
  `isbn` int(20) NOT NULL,
  `langugae` text NOT NULL,
  `binding` text NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

book_key	isbn	langugae	binding
124	14211134	French	hard
123	81086539	English	soft
125	229922518	French	hard
122	676625198	English	soft
121	730635632	English	hard
127	779635592	French	soft
126	851481145	English	hard

4. **Table structure for table `book_issued_details`**

```
CREATE TABLE `book_issued_details` (
  `receipt_no` int(10) NOT NULL,
  `book_key` int(10) DEFAULT 2,
  `issued_book_id` int(10) NOT NULL,
  `date_issued` date NOT NULL,
  `lend_type` text NOT NULL,
  `grace_period` varchar(50) NOT NULL,
  `time_issued_to_return` varchar(50) NOT NULL,
  `issued_to_member` int(10) DEFAULT 555555555,
  `issued_by_staff` int(10) DEFAULT 888888888
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

receipt_no	book_key	issued_book_id	date_issued	lend_type	grace_period	time_issued_to_return	issued_to_member	issued_by_staff
780	124	9	2019-01-28	loan	2 month	2019-07-12	645313005	658442161
781	123	7	2019-02-22	loan	1 month	2019-08-22	304073483	195720170
782	122	3	2019-07-21	loan	1 month	2019-12-15	256776597	195720170
783	124	10	2019-08-08	loan	1 month	2020-02-24	370942977	470835606
784	127	13	2019-08-26	loan	1 month	2020-01-14	256776597	837797042
785	126	12	2019-10-02	rent	2 month	2020-03-03	102644032	837797042
786	122	4	2019-11-10	loan	2 month	2020-02-12	667969801	470835606
787	121	1	2019-11-26	rent	1 month	2020-05-13	256776597	479194504
788	125	11	2019-12-08	rent	2 month	2020-03-22	645313005	837797042
789	123	6	2019-12-22	rent	2 month	2020-05-18	256776597	479194504
790	122	5	2020-02-22	loan	2 month	2020-06-23	492813885	665257443
791	124	8	2020-04-15	loan	1 month	2020-08-12	105512344	658442161
792	121	2	2020-04-17	rent	1 month	2020-07-20	645313005	479194504

5. **Table structure for table `library_card`**

```
CREATE TABLE `library_card` (
  `ssn` int(10) NOT NULL,
  `expirty_date` date NOT NULL,
  `notice_comments` varchar(500) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

ssn	expirty_date	notice_comments
102644032	2020-08-26	Your card expires in 4 months
105512344	2020-09-22	Your card expires in 5 months
256776597	2020-07-25	Your card expires in 3 months
304073483	2020-10-11	Your card expires in 6 months
370942977	2020-10-22	Your card expires in 6 months
492813885	2020-08-29	Your card expires in 4 months
645313005	2020-05-04	Your card expires in 1 months
667969801	2020-06-22	Your card expires in 2 months

6. **Table structure for table `member`**

```
CREATE TABLE `member` (
  `ssn` int(10) NOT NULL,
  `phone_no` varchar(15) NOT NULL,
  `address` varchar(100) NOT NULL,
  `campus_id` int(10) NOT NULL,
  `comments` varchar(500) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

ssn	phone_no	address	campus_id	comments
102644032	606-700-7707	6138 Becker Street	497970622	unleash magnetic methodologies
105512344	704-820-2238	55 Green Drive	790348557	synergize cross-platform infrastructures
256776597	258-260-5210	50078 Macpherson Terrace	545941825	disintermediate e-business niches
304073483	497-140-7462	41027 Havey Plaza	642180896	leverage extensible ROI
370942977	861-240-5495	518 Fremont Drive	119205960	drive global platforms
492813885	369-750-9560	81 Ridgeview Crossing	289521491	synthesize 24/7 eyeballs
645313005	461-750-3506	63 Everett Place	155270639	maximize global metrics
667969801	579-170-9867	68 Corscot Avenue	241379299	integrate bricks-and-clicks mindshare

7. **Table structure for table `staff`**

```
CREATE TABLE `staff` (
  `designation_id` int(10) DEFAULT 0,
  `ssn` int(10) NOT NULL,
  `name` varchar(50) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

designation_id	ssn	name
1	195720170	Nita Schoenrock
1	470835606	Claudie Clavey
2	479194504	Randee Grayley
4	658442161	Violante Janjusevic
3	665257443	Annalee Rottery
2	837797042	Adel Yankov

8. **Table structure for table `staff_designation`**

```
CREATE TABLE `staff_designation` (
  `designation_id` int(10) NOT NULL,
  `designation_type` text NOT NULL,
  `designation_power` int(5) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

designation_id	designation_type	designation_power
1	department_staff	0
2	library_assistant	0
3	reference_staff	1
4	cashier	0

9. **Primary Key Structure for all entities**

```
ALTER TABLE `book`
  ADD PRIMARY KEY (`book_key`);

ALTER TABLE `book_availability`
  ADD PRIMARY KEY (`id`),
  ADD UNIQUE KEY `book_key_2` (`book_key`),
  ADD KEY `book_key` (`book_key`);

ALTER TABLE `book_information`
  ADD PRIMARY KEY (`isbn`),
  ADD KEY `book_key` (`book_key`);

ALTER TABLE `book_issued_details`
  ADD PRIMARY KEY (`receipt_no`),
  ADD KEY `issued_by_staff` (`issued_to_member`),
  ADD KEY `issued_by_staff_2` (`issued_by_staff`),
  ADD KEY `book_key` (`book_key`);

ALTER TABLE `library_card`
  ADD PRIMARY KEY (`ssn`),
  ADD KEY `ssn` (`ssn`);

ALTER TABLE `member`
  ADD PRIMARY KEY (`ssn`);

ALTER TABLE `staff`
  ADD PRIMARY KEY (`ssn`),
  ADD KEY `designation_id` (`designation_id`),
  ADD KEY `ssn` (`ssn`);

ALTER TABLE `staff_designation`
  ADD PRIMARY KEY (`designation_id`),
  ADD KEY `designation_id` (`designation_id`);

ALTER TABLE `book_availability`
  MODIFY `id` int(11) NOT NULL AUTO_INCREMENT, AUTO_INCREMENT=8;
```

10. Foreign Key Structure for all entities

```
ALTER TABLE `book_availability`
  ADD CONSTRAINT `book_availability_ibfk_1` FOREIGN KEY (`book_key`) REFERENCES `book`
(`book_key`) ON DELETE SET NULL ON UPDATE CASCADE;

ALTER TABLE `book_information`
  ADD CONSTRAINT `book_information_ibfk_1` FOREIGN KEY (`book_key`) REFERENCES `book`
(`book_key`) ON DELETE SET NULL ON UPDATE CASCADE;

ALTER TABLE `book_issued_details`
  ADD CONSTRAINT `book_issued_details_ibfk_1` FOREIGN KEY (`issued_by_staff`) REFERENCES `staff`
(`ssn`) ON DELETE SET NULL ON UPDATE CASCADE,
  ADD CONSTRAINT `book_issued_details_ibfk_2` FOREIGN KEY (`book_key`) REFERENCES `book`
(`book_key`) ON DELETE SET NULL ON UPDATE CASCADE,
  ADD CONSTRAINT `book_issued_details_ibfk_3` FOREIGN KEY (`issued_to_member`) REFERENCES
`member` (`ssn`) ON DELETE SET NULL ON UPDATE CASCADE;

ALTER TABLE `library_card`
  ADD CONSTRAINT `library_card_ibfk_1` FOREIGN KEY (`ssn`) REFERENCES `member` (`ssn`) ON UPDATE
CASCADE;

ALTER TABLE `staff`
  ADD CONSTRAINT `staff_ibfk_1` FOREIGN KEY (`designation_id`) REFERENCES `staff_designation`
(`designation_id`) ON DELETE SET NULL ON UPDATE CASCADE;
```