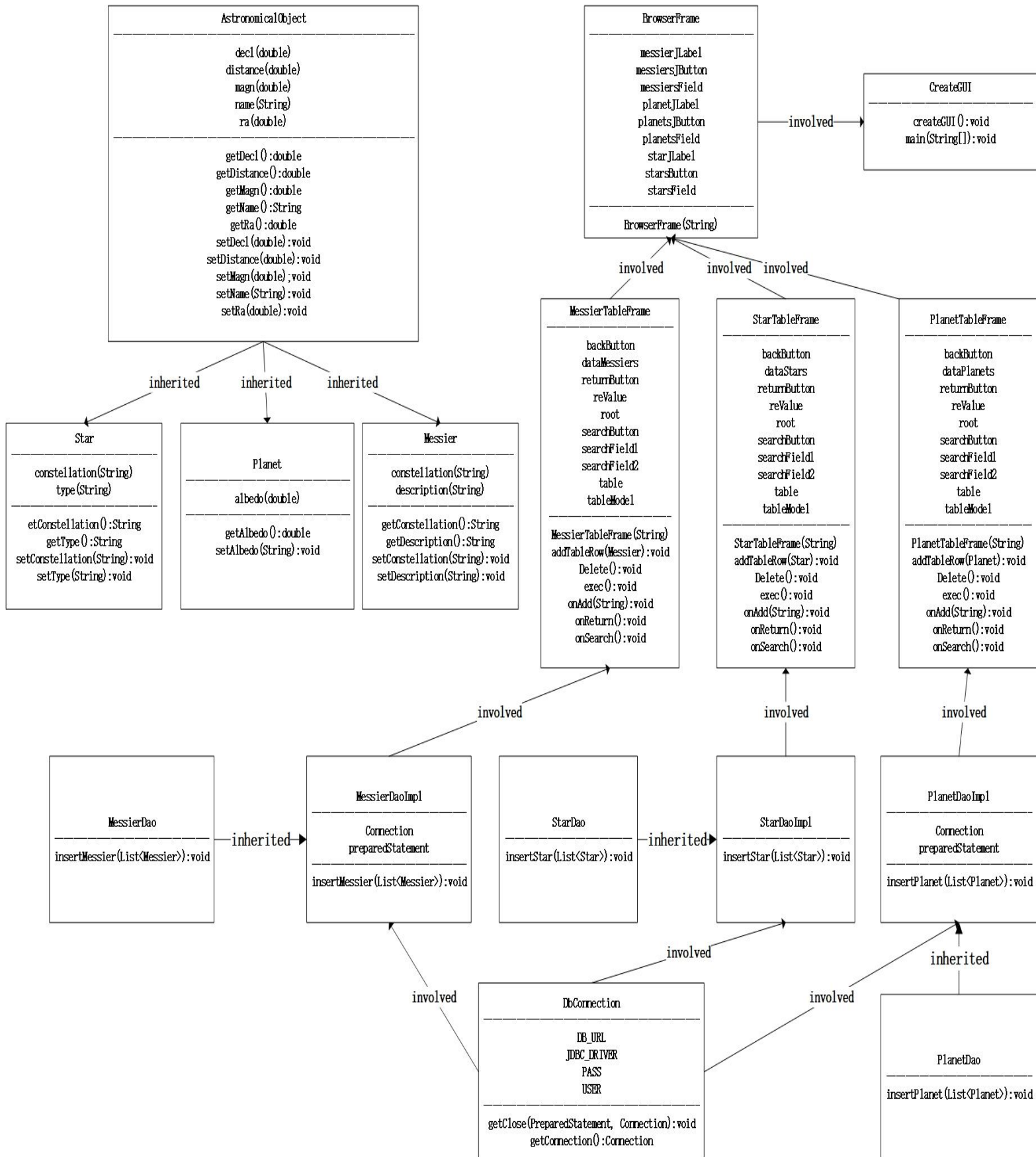


## Design Document for Stage3

### Design Diagram



### Interesting aspects of my design

- **Data Display in GUI interface:** In Stage 3, the data is displayed in the GUI interface through a table. I create three tables (**MessierTableFrame**, **StarTableFrame**, **PlanetTableFrame**) to store the data from three different classes (**Messier**, **Star**, **Planet**). The display format of the tables is the same as the database table. The main interface (**BrowserFrame**) is mainly composed of three **JTextFields** and three **JButtons**. Enter the corresponding txt file name in **JTextField** and click the button on the same line, the contents of txt file can be inserted into the table and the table can be displayed on the GUI interface. What's more, the contents of txt file can be inserted into the database table. All the functions (**Delete()**, **onReturn()**, **onSearch()**) are used in the specific table.
- **onReturn():** In "Return to the table with all data" function of Stage 3, I added a button called "Complete table". When the user completes his/her query purpose and want to return to the table with all the data, he/she can click the "Complete table" button. I implemented this function through a class (**DefaultTableModel**) and three lists (**List<Messier> dataMessiers**, **List<Star> dataStars**, **List<Planet> dataPlanets**). The **DefaultTableModel** class is responsible for outputting and displaying the queried data in the table, and the lists are used to store all the data in the txt files (**stars.txt**, **messier.txt**, **planets.txt**). For example, after clicking the "Complete table" button in the **stars** table, **onReturn()** method will first empty the **stars** table with the query result data and then insert all the contents of **List<Stars> dataStars** into the table row.
- **Delete():** In the **Delete()** method, it has a **String sql** which helps to delete all the data in the database table. The reason why I create this method is the **name/number** attribute in all classes is not repeatable. After inserting the data into the database for the first time, an exception will occur when the browser is used again. Delete the contents of the database table every time after you use it, there will be no exceptions. The **Delete()** method is connected with "Back" button. After clicking, the user will not only leave the interface but delete all data in the specific database table. If the user doesn't want to delete the data, he/she can click the "x" button and leave the table interface.

### What I have learnt

- **JButton and constructor connection:** In Stage 3, The main methods I created are **Delete()**, **onReturn()**, **onSearch()** and I use Lambda expression (**xxx.addActionListener((e)->{...});**) to make the buttons have these methods.
- **How to design a query in GUI (onSearch()):** The most important part I have learnt is how to design a query. I use 2 **JTextFields** (**searchField1**, **searchField2**) and 1 **JButton** (**searchButton**) to implement query function. Enter the database table name (Ex: **stars**) in **searchField1** and Enter the conditional statement in sql statemen into **searchField2** (Ex: **where ra > 300 and distance > 500**). These two parts are combined into a sql query statement created in **onSearch()**. Finally, use Lambda expression to make **searchButton** has **onSearch()** method.

### Screenshots illustration

Because I designed to display the data separately according to the category of astronomical objects, the following pictures are screenshots of me using the messier as examples. **[The display and functions of all astronomical object categories are the same as the following example]**

### Screenshots\_1: Insert the data in the file into the table

First enter the prompted file (**messier.txt**), then click “**View messier data**” button, and then it will jump into messiers table interface. The interface cannot be enlarged. **[The input part must fill in the correct documents, otherwise you cannot enter]**

#### Screenshots\_1

Input stars.txt	<input type="text"/>	View stars data
Input messier.txt	<input type="text" value="messier.txt"/>	View messier data
Input planets.txt	<input type="text"/>	View planets data

## Screenshots\_2 & Screenshots\_3: stars table interface

There are three buttons on the toolbar, which are used to query, return to the original data and return to the Browser interface. Two blank parts need to input the table name and query conditions. What's more, table can be scrolled vertically and the interface can be zoomed. Clicking “Back” button can return to the Browser interface (Screenshots\_1).

### SCREENSHOTS\_2

Back	Table name:	Conditions:	(sql Format: where ... and ...)		Search	Complete table
number	ra	decl	magn	distance	constellation	description
M1	83.520833	22.016667	8.4	6300.0	Tau	Crab Nebula
M2	323.270833	-0.816667	6.5	36200.0	Aqr	
M3	205.508333	28.383333	6.2	30600.0	CVn	
M4	245.775	-26.533333	5.6	6800.0	Sco	
M5	229.525	2.083333	5.6	22800.0	Ser	
M6	265.004167	-32.216667	5.3	2000.0	Sco	Butterfly Cluster
M7	268.2875	-34.816667	4.1	800.0	Sco	Ptolemy's Cluster
M8	270.783333	-24.383333	6.0	5200.0	Sgr	Lagoon Nebula
M9	259.758333	-18.516667	7.7	26400.0	Oph	
M10	254.254167	-4.1	6.6	13400.0	Oph	
M11	282.754167	-6.266667	6.3	6000.0	Sct	Wild Duck Cluster
M12	251.758333	-1.95	6.7	17600.0	Oph	
M13	250.279167	36.466667	5.8	22800.0	Her	Hercules Globular Clu...
M14	264.275	-3.25	7.6	27400.0	Oph	
M15	322.5	12.166667	6.2	32600.0	Peg	
M16	274.533333	-13.783333	6.4	7000.0	Ser	Eagle Nebula
M17	275.033333	-16.183333	7.0	5000.0	Sgr	Lobster Nebula
M18	274.7875	-17.133333	7.5	4900.0	Sgr	
M19	255.525	-26.266667	6.8	27100.0	Oph	
M20	270.525	-23.033333	9.0	5200.0	Sgr	Trifid Nebula
M21	271.025	-22.5	6.5	4250.0	Sgr	
M22	279.016667	-23.9	5.1	10100.0	Sgr	
M23	269.033333	-19.016667	6.9	2150.0	Sgr	
M24	274.0375	-18.483333	4.6	10000.0	Sgr	Sagittarius Star Cloud
M25	277.775	-19.25	6.5	2000.0	Sgr	
M26	281.258333	-9.4	8.0	5000.0	Sct	
M27	299.775	22.716667	7.4	1250.0	Vul	Dumbbell Nebula
M28	276.020833	-24.866667	6.8	17900.0	Sgr	
M29	305.7875	38.533333	7.1	4000.0	Cyg	
M30	325.016667	-23.183333	7.2	24800.0	Cap	
M31	10.529167	41.266667	3.4	2900000.0	And	Andromeda Galaxy
M32	10.529167	40.866667	8.1	2900000.0	And	
M33	23.2875	30.65	5.7	3000000.0	Tri	Triangulum Galaxy
M34	40.5	42.783333	5.5	1400.0	Per	
M35	92.0375	24.333333	5.3	2800.0	Gem	
M36	84.004167	34.133333	6.3	4100.0	Aur	
M37	88.016667	32.55	6.2	4400.0	Aur	
M38	82.016667	35.833333	7.4	4200.0	Aur	
M39	323.008333	48.433333	5.2	825.0	Cyg	
M40	185.516667	58.083333	8.4	510.0	UMa	Winnecke
M41	101.5	-20.733333	4.6	2300.0	CMa	
M42	83.766667	-5.45	4.0	1600.0	Ori	Orion Nebula
M43	83.775	-5.266667	9.0	1600.0	Ori	
M44	130.004167	19.983333	3.7	577.0	Cnc	Beehive Cluster
M45	56.75	24.116667	1.6	380.0	Tau	Pleiades
M46	115.283333	-14.816667	6.0	5400.0	Pup	
M47	114.025	-14.5	5.2	1600.0	Pup	
M48	123.283333	-5.8	5.5	1500.0	Hya	
M49	187.283333	8.0	8.4	6.0E7	Vir	
M50	105.758333	-8.333333	6.3	3000.0	Mon	
M51	202.2875	47.2	8.4	3.7E7	CVn	Whirlpool Galaxy
M52	351.008333	61.583333	7.3	5000.0	Cas	
M53	198.0375	18.166667	7.6	56400.0	Com	
M54	283.754167	-30.483333	7.6	82800.0	Sgr	
M55	295.0	-30.966667	6.3	16600.0	Sgr	
M56	289.025	30.183333	8.3	31600.0	Lyr	

### SCREENSHOTS\_3

messiers

Back

Table name:

Conditions:

(sql Format: where ... and ...)

Search

Complete table

number	ra	decl	magn	distance	constellation	description
M56	289.025	30.183333	8.3	31600.0	Lyr	
M57	283.275	33.033333	8.8	4100.0	Lyr	Ring Nebula
M58	189.279167	11.816667	9.7	6.0E7	Vir	
M59	190.5	11.65	9.6	6.0E7	Vir	
M60	190.779167	11.55	8.8	6.0E7	Vir	
M61	185.2875	4.466667	9.7	6.0E7	Vir	
M62	255.258333	-30.116667	6.5	21500.0	Oph	
M63	198.783333	42.033333	8.6	3.7E7	CVn	Sunflower Galaxy
M64	194.029167	21.683333	8.5	1.9E7	Com	Blackeye Galaxy
M65	169.5375	13.083333	9.3	3.5E7	Leo	
M66	170.008333	12.983333	8.9	3.5E7	Leo	
M67	132.516667	11.816667	6.1	2700.0	Cnc	
M68	189.770833	-26.75	7.8	32300.0	Hya	
M69	277.766667	-32.35	7.6	26700.0	Sgr	
M70	280.758333	-32.3	7.9	28000.0	Sgr	
M71	298.283333	18.783333	8.2	11700.0	Sge	
M72	313.270833	-12.533333	9.3	52800.0	Aqr	
M73	314.5375	-12.633333	9.0	1000.0	Aqr	
M74	24.029167	15.783333	9.4	3.5E7	Psc	
M75	301.504167	-21.916667	8.5	57700.0	Sgr	
M76	25.516667	51.566667	10.1	3400.0	Per	Little Dumbbell Nebula
M77	40.529167	-0.016667	8.9	6.0E7	Cet	Cetus A
M78	86.529167	-0.05	8.3	1600.0	Ori	
M79	81.020833	-24.55	7.7	41100.0	Lep	
M80	244.25	-22.983333	7.3	27400.0	Sco	
M81	148.775	69.066667	6.9	1.2E7	UMa	Bode's Galaxy
M82	148.783333	69.683333	8.4	1.2E7	UMa	Cigar Galaxy
M83	204.25	-29.866667	7.6	1.5E7	Hya	Southern Pinwheel
M84	186.254167	12.883333	9.1	6.0E7	Vir	
M85	186.266667	18.183333	9.1	6.5E7	Com	
M86	186.508333	12.95	8.9	6.0E7	Vir	
M87	187.533333	12.4	8.6	6.0E7	Vir	Virgo A
M88	188.0	14.416667	9.6	6.0E7	Com	
M89	188.779167	12.55	9.8	6.0E7	Vir	
M90	189.033333	13.166667	9.5	6.0E7	Vir	
M91	188.766667	14.5	10.2	6.0E7	Com	
M92	259.254167	43.133333	6.4	26400.0	Her	
M93	116.025	-23.866667	6.0	3600.0	Pup	
M94	192.5375	41.116667	8.2	1.45E7	CVn	
M95	161.0	11.7	9.7	3.8E7	Leo	
M96	161.533333	11.816667	9.2	3.8E7	Leo	
M97	168.533333	55.016667	9.9	2600.0	UMa	Owl Nebula
M98	183.283333	14.9	10.1	6.0E7	Com	
M99	184.533333	14.416667	9.9	6.0E7	Com	
M100	185.5375	15.816667	9.3	6.0E7	Com	
M101	210.758333	54.35	7.9	2.7E7	UMa	Pinwheel Galaxy
M102	226.520833	55.766667	9.9	4.0E7	Dra	Spindle Galaxy
M103	23.258333	60.7	7.4	8000.0	Cas	
M104	190.0	-11.616667	8.0	5.0E7	Vir	Sombrero Galaxy
M105	161.783333	12.583333	9.3	3.8E7	Leo	
M106	184.75	47.3	8.4	2.5E7	CVn	
M107	248.020833	-13.05	7.9	19600.0	Oph	
M108	167.770833	55.666667	10.0	4.5E7	UMa	
M109	179.275	53.383333	9.8	5.5E7	UMa	
M110	10.016667	41.683333	8.5	2900000.0	And	

## Screenshots\_4 & Screenshots\_5: Search Function

Enter the name (**messiers**) of the menu bar in the first blank space, enter the query conditions in SQL format in the second blank space, and click the **“Search”** button. When user need to go back to the original table (**Screenshots\_2 and Screenshots\_3**), click the **“Complete table”** button.

### Screenshots\_4

messiers						
Back	Table name: messiers	Conditions: where magn < 5.7	(sql Format: where ... and ...)		Search	Complete table
number	ra	decl	magn	distance	constellation	description
M22	279.016667	-23.9	5.1	10100.0	Sgr	Sagittarius Star Cloud
M24	274.0375	-18.483333	4.6	10000.0	Sgr	
M31	10.529167	41.266667	3.4	2900000.0	And	
M34	40.5	42.783333	5.5	1400.0	Per	
M35	92.0375	24.333333	5.3	2800.0	Gem	Orion Nebula
M39	323.008333	48.433333	5.2	825.0	Cyg	
M4	245.775	-26.533333	5.6	6800.0	Sco	
M41	101.5	-20.733333	4.6	2300.0	CMa	
M42	83.766667	-5.45	4.0	1600.0	Ori	Beehive Cluster
M44	130.004167	19.983333	3.7	577.0	Cnc	
M45	56.75	24.116667	1.6	380.0	Tau	
M47	114.025	-14.5	5.2	1600.0	Pup	
M48	123.283333	-5.8	5.5	1500.0	Hya	Pleiades
M5	229.525	2.083333	5.6	22800.0	Ser	
M6	265.004167	-32.216667	5.3	2000.0	Sco	
M7	268.2875	-34.816667	4.1	800.0	Sco	

### Screenshots\_5

messiers						
Back	Table name: messiers	Conditions: < 5.7 and magn > 4.3	(sql Format: where ... and ...)		Search	Complete table
number	ra	decl	magn	distance	constellation	description
M22	279.016667	-23.9	5.1	10100.0	Sgr	Sagittarius Star Cloud
M24	274.0375	-18.483333	4.6	10000.0	Sgr	
M34	40.5	42.783333	5.5	1400.0	Per	
M35	92.0375	24.333333	5.3	2800.0	Gem	
M39	323.008333	48.433333	5.2	825.0	Cyg	Orion Nebula
M4	245.775	-26.533333	5.6	6800.0	Sco	
M41	101.5	-20.733333	4.6	2300.0	CMa	
M47	114.025	-14.5	5.2	1600.0	Pup	
M48	123.283333	-5.8	5.5	1500.0	Hya	Beehive Cluster
M5	229.525	2.083333	5.6	22800.0	Ser	
M6	265.004167	-32.216667	5.3	2000.0	Sco	