

**Project Description :**

To appreciate the architecture of Persistence in Java called JPA which was achieved using EclipseLink Which is the JPA provider & also Hibernate Framework. In this project we have implemented the JPA using both provider & we have managed to population data analytics with help of data provided by U.S central bureau.

This project will be definitely help for US Government bodies as it easily maps with database tables & populated the table with help of Object Relational Mapping called ORM. This project can be extended & made more robust suiting for the commercial & analysis purpose. This architecture also allows many other features such caching, pagination, managing many other entities.

**Installation , Compile and Runtime Requirements**

- Microsoft Windows 7 Version 7.0.1 running on x32
- 2GB RAM
- 320 GB Hard Disk
- Intel Core to Duo Processor
- JDK 1.7.0
- Net Beans IDE 7.0.1
- Glass fish web server
- MySql 5.2
- Browser Mozilla Firefox / Chrome
- JPA Provider EclipseLink & Hibernate ORM
- Maven

The usage of maven makes automatic buildings, downloading the dependencies & linking with the project.

This makes development & testing fast as developer need not worry about the linking of latest of the particular version of jar & it requires the net connection to automatically download & link the jar required for the project.

It also helps in plug in various other features link Junit, which is help in performing unit test & eliminates regression & prominent bugs. This project has Junit link but no test cases are included as its out of scope of this project requirement.

**Database**

This project is already configured to JNDI datasource called ***DataSource*** & database ***itm4515db*** as mention as the requirement for both the JPA providers i.e. JPA & Hibernate ORM.

## Insights and expected results

- **JPA** provided by EclipseLink & Hibernate help in Object relation mapping either by the creating the class of the required columns or the by mapping the database's tables there by its mapping the corresponding columns. The entity are highlight with help of annotation such

@entity denotes entity class,

@id denotes primary

@table denotes table name ... & So on

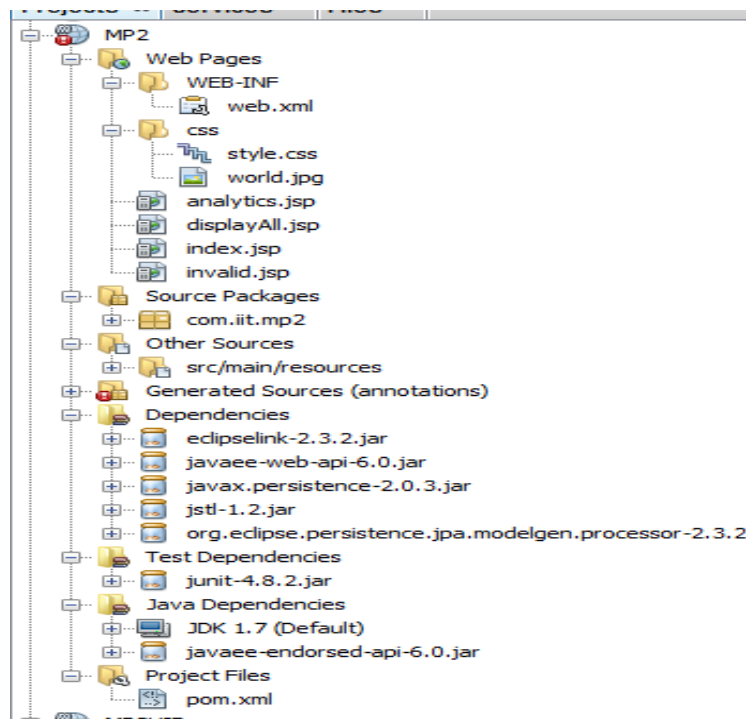
This results in success mapping & fetching the results. Also provides caching.

Entity is dependent on persistence.xml which hold the JNDI mapping as well

JPQL & Native queries are used to fetch the results.

- **Hibernate** maps based on its Hibernate configure file (hibernate.config.xml) & mapping file called resource mapper ( <name>.hbx.xml ). This help in identifying the entity class. HQL Hibernate Query Language is used the fetch the results & SQLQuery is allowed as well.
- **Maven** as discussed earlier help in automatically configuring the project.
- **JSTL** tags are used to check the conditions. Tag lib like core & function TagLibs are used.
- **HTML5 & CSS** is used to maintained the web pages which makes easier to maintain Layout & web components which are required to displayed the data analytics related to this project

## Screen captures



**Fig : Project Hierarchy (JPA Eclipse Link)**

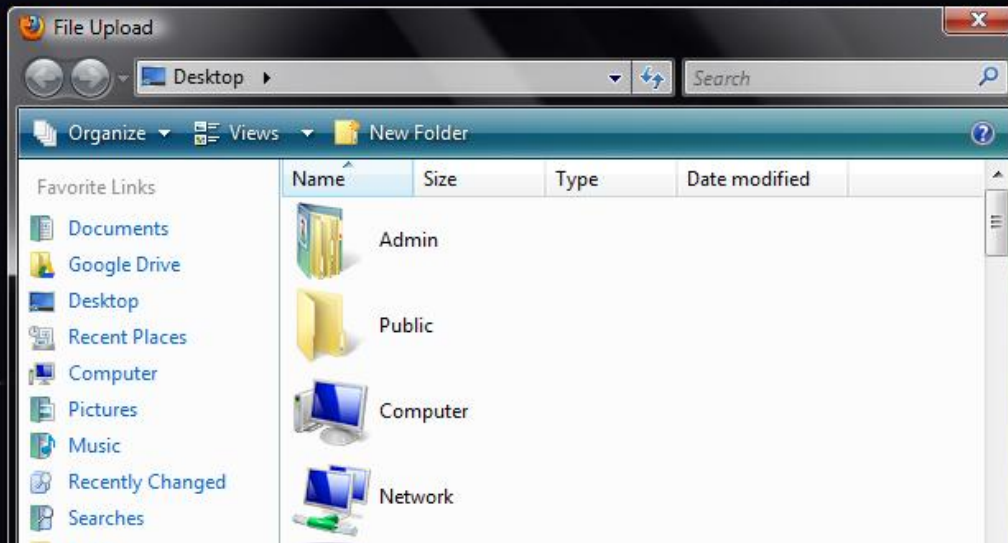
## U.S. Census Bureau, Population Division

Please upload file to generate data analytics Census

C:\Users\Admin\Desкто

Browse...

Upload File



**Fig : Event driven input feed which allows the used to browse his csv file**

```
INFO: [EL Config]: 2012-10-14 23:35:29.421--ServerSession(20686644)--Connection(18555474)--Thread(Thread[http-
platform=>MySQLPlatform
user name=> ""
connector=>JNDIConnector datasource name=>DataSource
))

INFO: [EL Config]: 2012-10-14 23:35:29.422--ServerSession(20686644)--Connection(19878293)--Thread(Thread[http-
User: root@localhost
Database: MySQL Version: 5.5.28-enterprise-commercial-advanced
Driver: MySQL-AB JDBC Driver Version: mysql-connector-java-5.1.18 ( Revision: tonci.grgin@oracle.com

INFO: [EL Info]: 2012-10-14 23:35:29.424--ServerSession(20686644)--Thread(Thread[http-thread-pool-8082(5),5,
INFO: [EL Finest]: 2012-10-14 23:35:29.426--ServerSession(20686644)--Thread(Thread[http-thread-pool-8082(5),5,1
```

**Fig : Linking of JNDI datasource**

```
INFO: [EL Fine]: 2012-10-14 23:19:00.3--ClientSession(10754975)--Connection(5944276)--Thread(Thread[htt
bind => [California, 123173, 508069, 37253956, 57867, 234045, 9, -15021, -50684, 37253956, 3351

INFO: [EL Finest]: 2012-10-14 23:19:00.333--UnitOfWork(1145765)--Thread(Thread[http-thread-pool-8082(1)

INFO: [EL Fine]: 2012-10-14 23:19:00.334--ClientSession(10754975)--Connection(5944276)--Thread(Thread[h
bind => [New Mexico, 7109, 28511, 2059179, 3636, 15760, 8, 2135, 67, 2059180, 1088, 3471, 3473,

INFO: [EL Finest]: 2012-10-14 23:19:00.356--UnitOfWork(1145765)--Thread(Thread[http-thread-pool-8082(1)

INFO: [EL Fine]: 2012-10-14 23:19:00.357--ClientSession(10754975)--Connection(5944276)--Thread(Thread[h
bind => [South Dakota, 2968, 11763, 814180, 1329, 6772, 4, 646, 1964, 814180, 157, 533, 1639, 4

INFO: [EL Finest]: 2012-10-14 23:19:00.377--UnitOfWork(1145765)--Thread(Thread[http-thread-pool-8082(1)

INFO: [EL Fine]: 2012-10-14 23:19:00.378--ClientSession(10754975)--Connection(5944276)--Thread(Thread[h
bind => [Missouri, 18600, 75910, 5988927, 13350, 54361, 4, -26, -11805, 5988927, 1638, 5319, 52

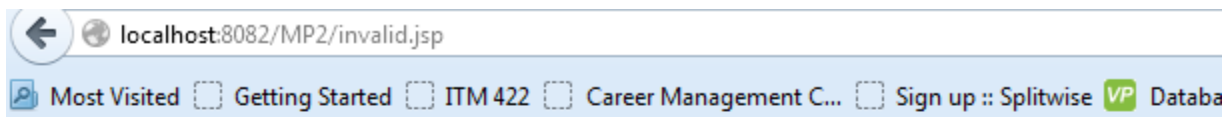
INFO: [EL Finest]: 2012-10-14 23:19:00.422--UnitOfWork(1145765)--Thread(Thread[http-thread-pool-8082(1)

INFO: [EL Fine]: 2012-10-14 23:19:00.423--ClientSession(10754975)--Connection(5944276)--Thread(Thread[h
bind => [West Virginia, 5127, 20642, 1852994, 5380, 21640, 5, 1481, 1333, 1852996, 199, 715, -2

INFO: [EL Finest]: 2012-10-14 23:19:00.444--UnitOfWork(1145765)--Thread(Thread[http-thread-pool-8082(1)

INFO: [EL Fine]: 2012-10-14 23:19:00.445--ClientSession(10754975)--Connection(5944276)--Thread(Thread[h
bind => [Wisconsin, 17577, 69346, 5686986, 11376, 46070, 3, -2807, -8183, 5686986, 1400, 5158,
```

**Fig : Process or binding of CSV after validation of csv file observed in traces.**



## Import of csv failed.

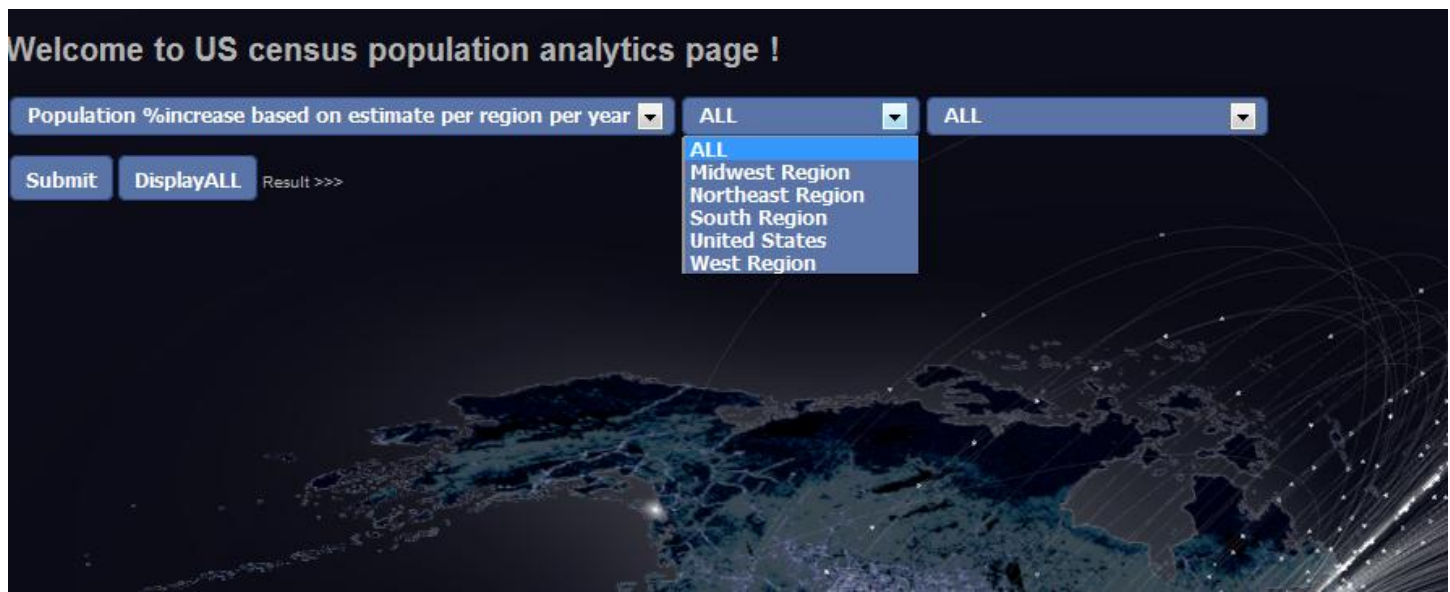
## Please see error or log for more details!

**Fig : Import of csv failure when there is improper data, it skips row if rows are < 31 columns**

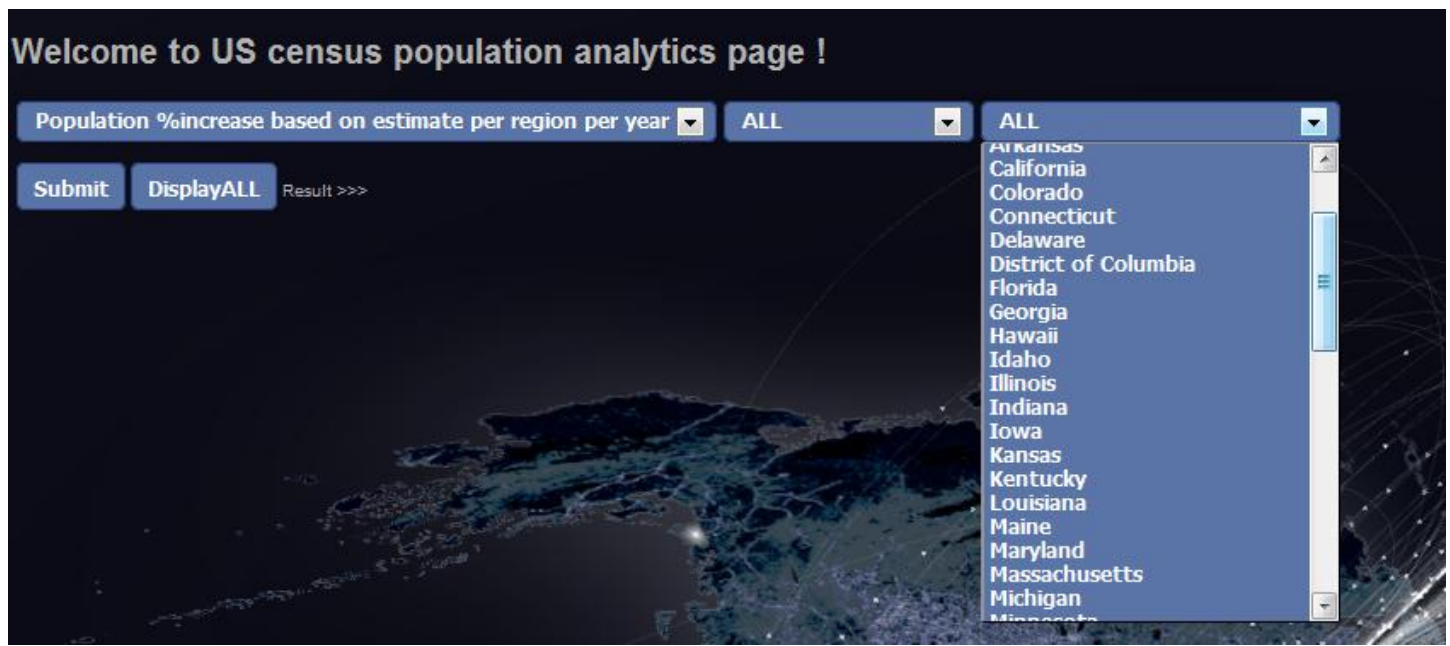
```
mysql> desc uscensuspopulationdata;
```

Field	Type	Null	Key	Default	Extra
NAME	varchar(255)	NO	PRI	NULL	
BIRTHS2010	int(11)	YES		NULL	
BIRTHS2011	int(11)	YES		NULL	
CENSUS2010POP	int(11)	YES		NULL	
DEATHS2010	int(11)	YES		NULL	
DEATHS2011	int(11)	YES		NULL	
DIVISION	int(11)	YES		NULL	
DOMESTICMIG2010	int(11)	YES		NULL	
DOMESTICMIG2011	int(11)	YES		NULL	
ESTIMATESBASE2010	int(11)	YES		NULL	
INTERNATIONALMIG2010	int(11)	YES		NULL	
INTERNATIONALMIG2011	int(11)	YES		NULL	
NATURALINC2010	int(11)	YES		NULL	
NATURALINC2011	int(11)	YES		NULL	
NETMIG2010	int(11)	YES		NULL	
NETMIG2011	int(11)	YES		NULL	
NPOPCHG_2010	int(11)	YES		NULL	
NPOPCHG_2011	int(11)	YES		NULL	
POPESTIMATE2010	int(11)	YES		NULL	
POPESTIMATE2011	int(11)	YES		NULL	
RBIRTH2011	float	YES		NULL	
RDEATH2011	float	YES		NULL	
RDOMESTICMIG2011	float	YES		NULL	
REGION	int(11)	YES		NULL	
RESIDUAL2010	int(11)	YES		NULL	
RESIDUAL2011	int(11)	YES		NULL	
RINTERNATIONALMIG2011	float	YES		NULL	
RNATURALINC2011	float	YES		NULL	
RNETMIG2011	float	YES		NULL	
STATE	int(11)	YES		NULL	

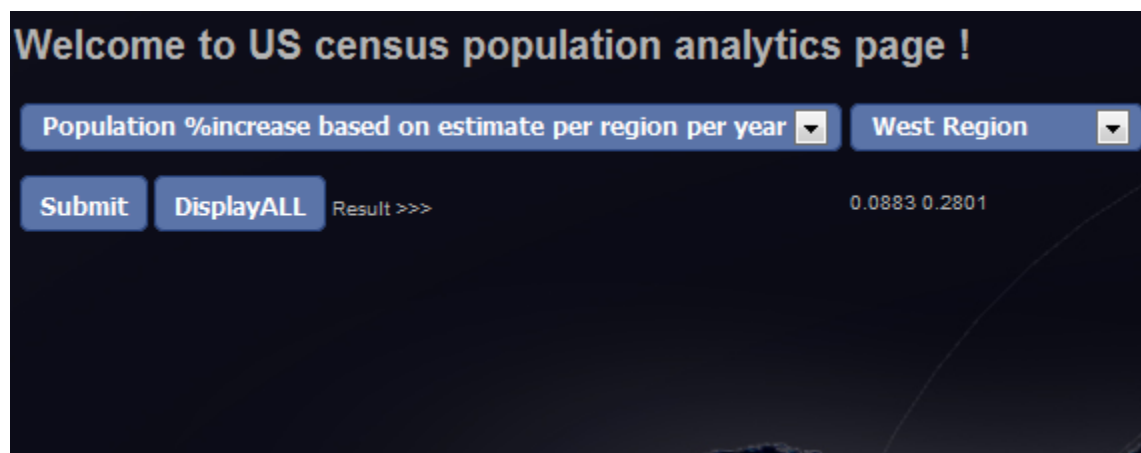
**Fig : Mapping of entity class which has generated the table called uscensuspopulationdata in itm4515db**



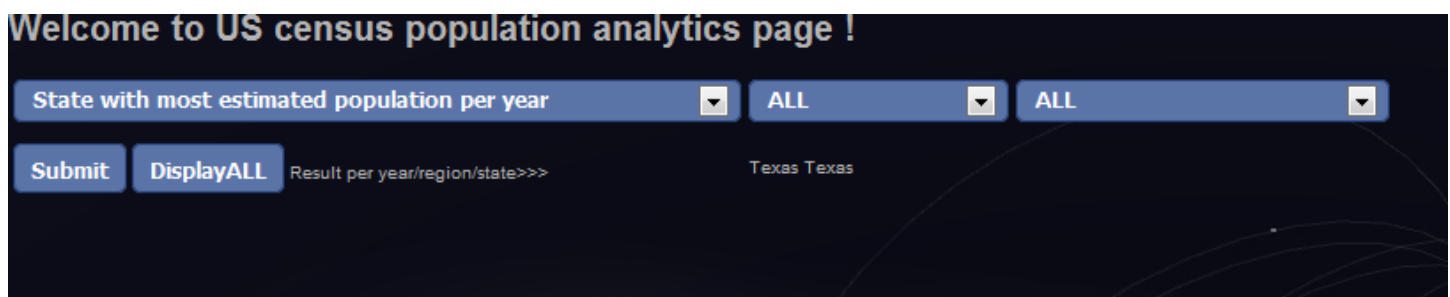
**Fig : Web component which is generated dynamically based on the data loaded, pull down menu displaying regions & other components**



**Fig : Population states as web-component**



**Fig : population %increase west region 2010 & 2011**



**Fig : Displaying Texas is most populated in 2010 & 2011**



## Welcome to US census population analytics page !

Max & Min births per state per year

ALL

Arkansas

Submit

DisplayALL

Result per year/region/state>>>

6759 28478

Fig : Max & Min birth for Arkansas state

localhost:8082/MP2/displayAll.jsp

mapping resource= contact.hbm...

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### US census population data 2010-11

SUMLEV	REGION	DIVISION	STATE	NAME	CENSUS2010POP	ESTIMATESBASE2010	POPESTIMATE2010	POPESTIMATE2011	NPOPCHG_2010	NPOPCHG_2011	BIRTHS2010	BIRTHS2011	DEATHS2010
10	0	0	0	United States	308745538	308745538	309330219	311591917	584681	2261698	990000	4008000	595786
20	1	0	0	Northeast Region	55317240	55317244	55366108	55521698	48864	155490	161044	644052	112828
20	2	0	0	Midwest Region	66927001	66926987	66976458	67158835	49471	182377	211730	844948	138684
20	3	0	0	South Region	114555744	114555757	114857529	116046736	301772	1189207	375655	1534432	228433
20	4	0	0	West Region	71945553	71945550	72130124	72864748	184574	734624	241571	984568	115841
40	3	6	1	Alabama	4779736	4779735	4786401	4802740	5666	17339	14482	59866	11562
40	4	9	2	Alaska	710231	710231	714146	722718	3915	8572	2834	11193	647
40	4	8	4	Arizona	6392017	6392013	6413158	6482505	21145	69347	20900	87887	11164
40	3	7	5	Arkansas	2915918	2915921	2921588	2937979	5667	16391	9215	38156	6759
40	4	9	6	California	37253956	37253956	37338198	37691912	84242	353714	123173	508069	57867
40	4	8	8	Colorado	5029196	5029196	5047692	5116796	18496	69104	16453	66213	7350
40	1	1	9	Connecticut	3574097	3574097	3575498	3580709	1401	5211	9241	37319	6855
40	3	5	10	Delaware	887934	887934	899792	907135	1858	7343	2774	31172	1898
40	3	5	11	District of Columbia	601723	601723	604912	617996	3189	1308	2232	9003	1098
40	3	5	12	Florida	18801310	18801311	18938613	19057542	37302	218928	51537	243282	32087
40	3	5	13	Georgia	9687653	9687660	9732157	9816210	22497	103053	32410	134443	16840
40	4	9	15	Hawaii	1360301	1360301	1363359	1374810	3058	1451	4600	18501	2241
40	4	8	16	Idaho	1567582	1567582	1571102	1584985	3520	13883	5789	22954	2545
40	2	3	17	Illinois	12830632	12830632	12841980	12869257	11295	27277	42060	167000	24484
40	2	3	18	Indiana	6483802	6483800	6490622	6516322	8820	26300	21286	84732	14122
40	2	4	19	Iowa	3046355	3046350	3050202	3062309	3852	12107	9400	38324	6433
40	2	4	20	Kansas	2853118	2853118	2869149	2871238	8025	12095	9845	40132	5459
40	3	6	21	Kentucky	4339367	4339362	4347223	4369395	7861	22133	13991	56447	10486
40	3	7	22	Louisiana	4533372	4533372	4546343	4574836	11971	29493	15571	63969	9771
40	1	1	23	Maine	1328361	1328361	1327379	1328188	-982	809	3186	12868	3290

Fig : Display all which will display all the result

## Welcome to US census population analytics page !

Population %increase based on estimate per region per year

ALL

Population %increase based on estimate per region per year

Max & Min births per state per year

Max & Min deaths per state per year

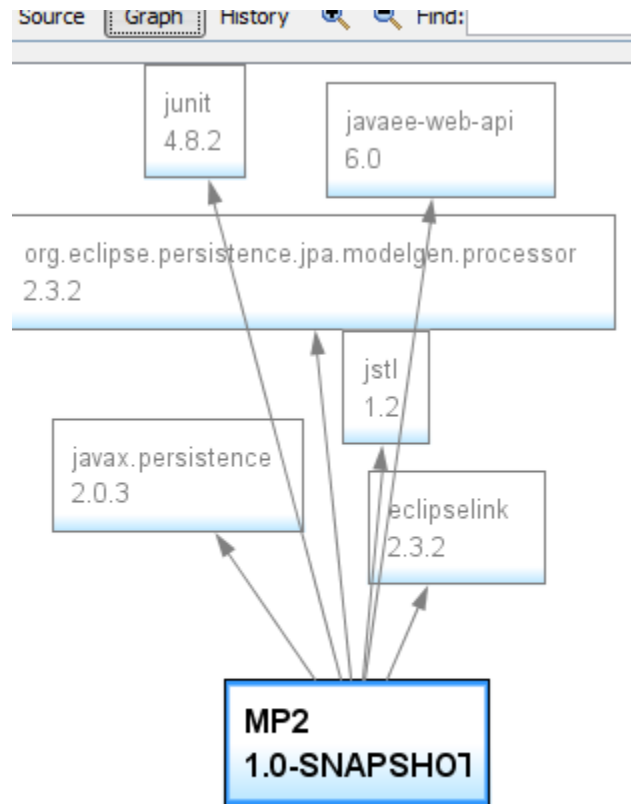
Number of states with estimated population increase

Number of states with estimated population decrease

State with most estimated population per year

State with least estimated population per year

Fig : Analytics options as per requirement



**Fig : pom.xml Graph display**

**Conclusion & Learning :**

- ✓ Implementing Entity for JPA Eclipse Link & Hibernate.
- ✓ Using this architecture the Object Mapping becomes very easy.
- ✓ The Web component & database linking becomes easier.
- ✓ JSTL tag help in maintained MVC & avoid scriplets
- ✓ Less coding with help of mapping & automatic designing in Netbeans in case of JPA
- ✓ Integration of web component, parsing XML & configuring technologies
- ✓ Using JPQL, HQL & Native Query becomes easier accessing entities.