Credit Cards Data Warehouse

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1 OVERVIEW:

In this project you will be using the PowerCenter to create a more complex project that would align closely to the demands of a real-world business.

In Banking systems for example,
client data and their privacy is set to the highest priority, any leakage or damage to the data would affect the data integrity and would cause devastating results to the structure as a whole, this is why techniques like Data masking is utilized to insure the privacy of data, and techniques in data warehousing insure that the data being backed up for redundancy against data loss.

Data archiving is also as important as data backups as it allows the business to store information that is not currently needed for any future reference or regulatory compliance reasons.

2 SCENARIO:

You are asked to create 2 target tables **CREDIT_CARDS_ARCHIVE** and **CREDIT_CARDS_CURRENT** in an Excel Files both tables should contain:

- *CC_SUR (Tf)*
- *CC_NUMBER*
- *CC_NUMBER_MASKED (Tf)*
- *CC_BAL*
- *CC_LIMIT*
- *CC_OPEN_DATE*
- *ACCT_OPEN_DATE*
- *EMP_NAME*
- *EMP_EMAIL*
- *EMP_DEPT_NAME*

And according to below logic:

- **CREDIT_CARDS_ARCHIVE** contains all credit cards that are created before a (specific date)
- **CREDIT_CARDS_CURRENT** contains all credit cards are created on or after a (specific date)
- *CC_NUMBER_MASKED* should contain *CC_NUMBER* masked (allow 3 digits left, 3 digits right, and mask the rest with 'X', example: 111XXXXXXXXX111)
- *CC_SUR* field is a surrogate key that is incremented with each new record and should preserve the value for subsequent executions (not to be reset)
- Any record with *CC_NUMBER* not equal to 16 digits should not be loaded and should be forwarded to an error file called "REJECTED_DATA.csv"

Points to consider:

- The <u>date</u> is to configurable as a parameter (use parameter file)
- Execution should not start unless a 'ready' file is available at the server indicating execution is permitted (EventWait)
- Target tables should insert new data, update existing data based on *CC_NUMBER*, data truncation is not allowed

3 GOAL:

To create a more complex project that would requires a more logical approach and a more comprehensive error handling. Aiming to get more fluent with the PowerCenter functionalities and features. The increased complexity would assist into developing more into the research of things and testing different approaches to achieve the desired business needs.

4 RESOURCES:

Source Table(s): DEMO_ACCOUNT, DEMO_CREDIT_CARD, DEMO_DEPT, DEMO_EMPLOYEE

Source System Schema: SRC_SYS @ ORCLDB

Login: SRC_SYS/ SRC_SYS

Target Table(s): FLAT FILE (CREDIT_CARDS_ARCHIVE and CREDIT_CARDS_CURRENT)

SCENARIO OVERVIEW: END-TO-END CREDIT CARD DATA PROCESSING WORKFLOW

This scenario documents the complete flow of credit card data from various source systems through transformation and validation processes to final storage in target databases, including handling of rejected records.
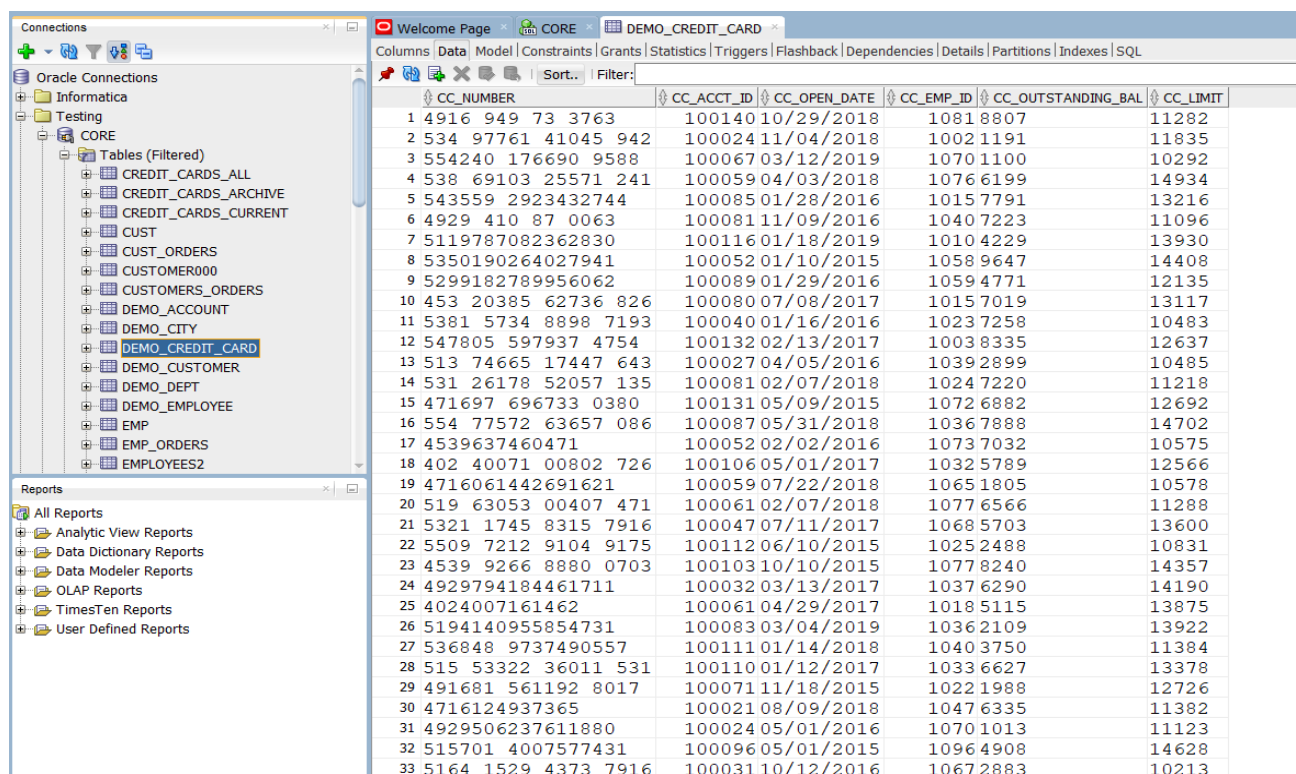
DETAILED WORKFLOW

1. Data Extraction Phase

Source Systems:

Oracle Databases: Data is extracted from multiple Oracle database tables including:

- DEMO_CREDIT_CARD (contains raw credit card information)
- DEMO_CUSTOMER (customer details associated with cards)
- DEMO_EMPLOYEE (employee records for card issuers)
- DEMO_ACCOUNT (account information)
- DEMO_DEPT (department details)
- DEMO_CITY(city details)

Figure 1. DEMO_CREDIT_CARD table

Figure 2. DEMO_CUSTOMER table

Figure 3. DEMO_EMPLOYEE table

DEPT_ID	DEPT_NAME	DEPT_CATEG	DEPT_LOC
1	Management	A	Alexandria
2	Accounting	A	Alexandria
3	Sales	B	Cairo
4	HR	A	Alexandria
5	Customer Support	B	Cairo

Figure 4. DEMO_DEPT table

Flat Files: Additional credit card data is extracted from:

CREDIT_CARD_ALL.out (comprehensive card data flat file)

2. Initial Processing and Routing

Extracted data flows into the RTRTRANS (routing transformation) system which acts as a hub:

- Determines appropriate processing path based on record type and content
- Routes data to either current processing or archival streams

3. Data Transformation

Masking Operations:

- Sensitive credit card numbers are masked (EXP_CC_NUM_MASKED)
- Original numbers are preserved in encrypted format to remove whit spaces (EXP_REM_CC_NUM)
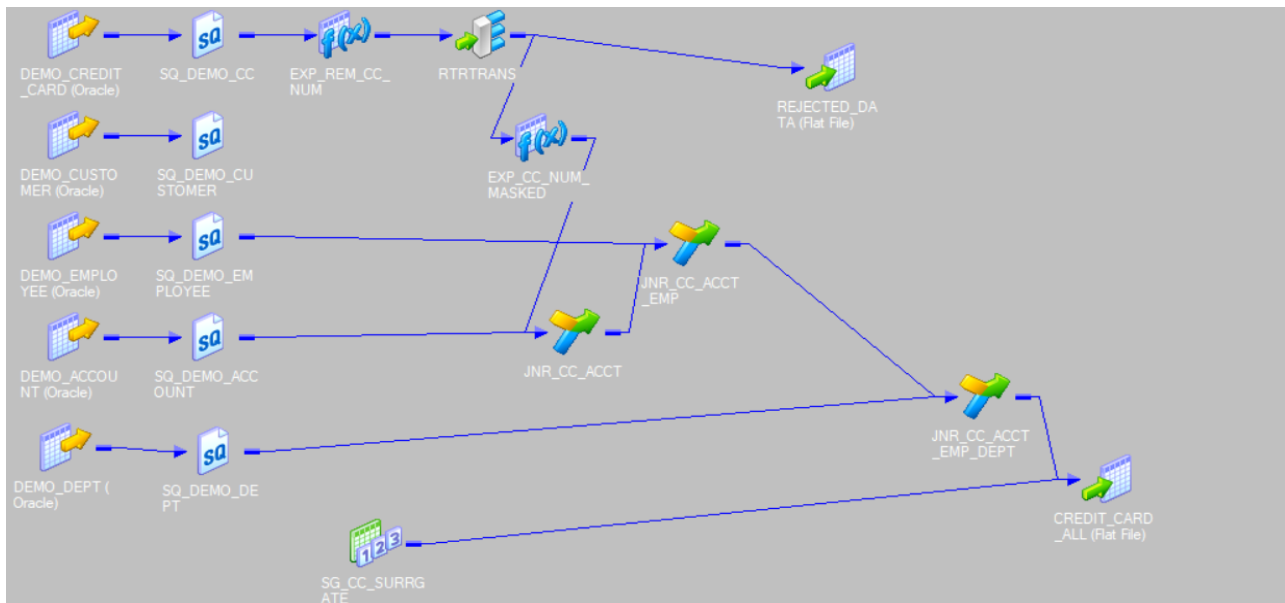

Figure 5. "M_CC_DWH" ALL CREDIT CARDS DWH MAPPING

Data Enrichment:

- Customer records from DEMO_CUSTOMER are joined with card data
- Employee information from DEMO_EMPLOYEE is linked to card records
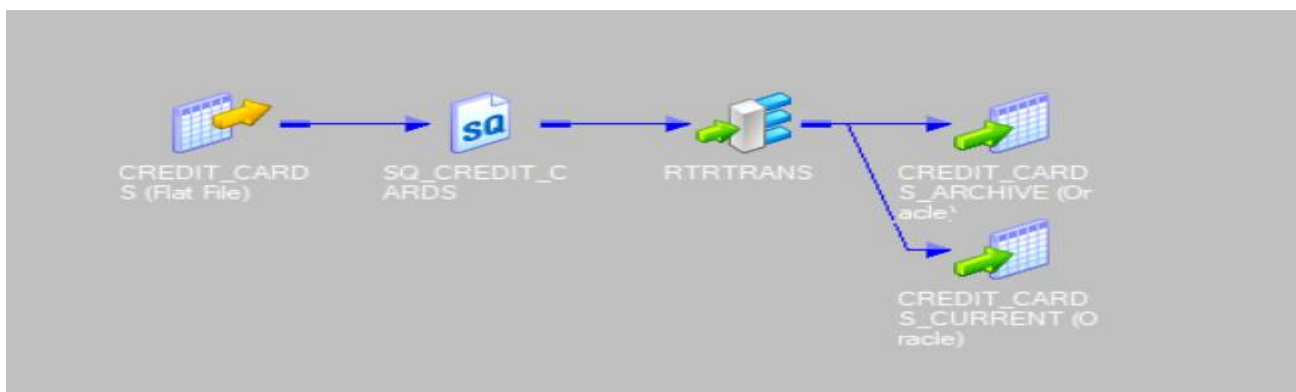- Department details from DEMO_DEPT are added to provide organizational context

Figure 6. "M_CC_ARCHIVING" ARCHIVED AND CURRENT CREDIT CARDS MAPPING

4. Validation and Quality Checks

Active Records Processing:

Complete records are stored in ALL_CREDIT_CARDS (flat file)

CC_SUR	CC_NUMBER	CC_NUMBER_MASKED	CC_BALANCE	CC_LIMIT	CC_OPEN_DATE	ACCT_OPEN_DATE	EMP_NAME	EMP_EMAIL	EMP_DEPT_NAME
173	5349776141045940	534xxxxxxxxx942	1191	11835	11/4/2018	8/1/2016	Hop Mclaughlin	amet.luctus@mattisornarelectus.edu	HR
174	5542401766909580	554xxxxxxxxx588	1100	10292	3/12/2019	12/26/2016	Fatima Stevens	Proin.ultrices@nascetur.edu	Customer Support
175	5386910325571240	538xxxxxxxxx241	6199	14934	4/3/2018	8/30/2017	Winifred Mckay	sed.est.Nunc@enimcommodo.org	Sales
176	5435592923432740	543xxxxxxxxx744	7791	13216	1/28/2016	2/21/2016	Noble Watkins	vel.arcu.eu@ipsum.co.uk	Management
177	5119787082362830	511xxxxxxxxx830	4229	13930	1/18/2019	7/18/2015	Azalia Holden	Sed.auctor.odio@commodotinciduntnibh.co.uk	HR
178	5350190264027940	535xxxxxxxxx941	9647	14408	1/10/2015	1/5/2016	Cara Tucker	justo.Proin@FuscefeugiatLorem.org	Management
179	5299182789956060	529xxxxxxxxx062	4771	12135	1/29/2016	3/9/2018	Forrest Frye	Donec.tempus@ipsum.edu	Sales
180	4532038562736820	453xxxxxxxxx826	7019	13117	7/8/2017	3/29/2017	Noble Watkins	vel.arcu.eu@ipsum.co.uk	Management
181	5381573488987190	538xxxxxxxxx193	7258	10483	1/16/2016	11/1/2015	Ima Parks	nibh.lacinia.orci@commodotinciduntnibh.ca	Customer Support
182	5478055979374750	547xxxxxxxxx754	8335	12637	2/13/2017	10/13/2015	Kirsten Guerra	diam@pellentesquea.co.uk	Accounting
183	5137466517447640	513xxxxxxxxx643	2899	10485	4/5/2016	8/16/2017	Craig Skinner	eu.euismod.ac@euaugue.org	Sales
184	5312617852057130	531xxxxxxxxx135	7220	11218	2/7/2018	5/23/2017	Marvin Wood	justo.eu.arcu@AliquamnislNulla.co.uk	HR
185	4716976967330380	471xxxxxxxxx380	6882	12692	5/9/2015	5/30/2018	Sophia Cohen	id.mollis@estvitaesodales.com	Management
186	5547757263657080	554xxxxxxxxx086	7888	14702	5/31/2018	7/2/2015	Alika Farley	id@velarcuCurabitur.com	HR
187	4024007100802720	402xxxxxxxxx726	5789	12566	5/1/2017	1/4/2019	Robin Johnston	non.quam.Pellentesque@eratsemperrutrum.org	Sales
188	4716061442691620	471xxxxxxxxx621	1805	10578	7/22/2018	8/30/2017	Liberty Reeves	lacus.Etiam@eusem.co.uk	Sales
189	5196305300407470	519xxxxxxxxx471	6566	11288	2/7/2018	4/29/2015	Vielka Potter	suscipit@lacinia.co.uk	Accounting
190	5321174583157910	532xxxxxxxxx916	5703	13600	7/11/2017	5/11/2017	Ocean Walter	at@nisi.org	HR
191	5509721291049170	550xxxxxxxxx175	2488	10831	6/10/2015	7/7/2015	Abbot Townsend	urna.Vivamus@elementumdui.com	Sales
192	4539266688800700	453xxxxxxxxx703	8240	14357	10/10/2015	2/25/2015	Vielka Potter	suscipit@lacinia.co.uk	Accounting
193	4929794184461710	492xxxxxxxxx711	6290	14190	3/13/2017	11/30/2017	Tanek Stark	diam.nunc.ullamcorper@dictum.co.uk	Customer Support
194	5194140955854730	519xxxxxxxxx731	2109	13922	3/4/2019	9/22/2017	Alika Farley	id@velarcuCurabitur.com	HR
195	5368489737490550	536xxxxxxxxx557	3750	11384	1/14/2018	1/16/2017	Jemima Fernandez	orci@Etiam.com	HR
196	5155332236011530	515xxxxxxxxx531	6627	13378	1/12/2017	8/19/2015	Germane Owens	Integer@vitaealiquet.net	Customer Support
197	4916815611928010	491xxxxxxxxx017	1988	12726	11/18/2015	4/4/2015	Leo Vasquez	Mauris.non@tempuslorem.edu	Accounting
198	4929506237611880	492xxxxxxxxx880	1013	11123	5/1/2016	8/1/2016	Fatima Stevens	Proin.ultrices@nascetur.edu	Customer Support

Figure 7. ALL CREDIT CARDS table in DWH before ARCHIVING

Rejected Data Handling:

Invalid or incomplete records are routed to REJECTED_DATA (flat file)

Problematic records from any card is less than 16 numbers operations are specifically handled.

CC_NUMBER	CC_ACCT_ID	CC_OPEN_DATE	CC_EMP_ID	CC_OUTSTANDING_BAL	CC_LIMIT
4916949733763	100140	10/29/2018	1081	8807	11282
4929410870063	100081	11/9/2016	1040	7223	11096
4539637460471	100052	2/2/2016	1073	7032	10575
4024007161462	100061	4/29/2017	1018	5115	13875
4716124937365	100021	8/9/2018	1047	6335	11382
4556167045332	100094	8/12/2017	1025	3729	14926
4539632804939	100109	9/9/2017	1051	8794	12097

Figure 8. REJECTED CARD NUMBERS in REJECTED_DATA.csv

5. Final Storage and Archiving

Current Records:

Before passing the data to be categorised historically, first we have to determine the parameter that will control the separation of data.

Parameter $$date from parameter file

```
[Credit_Cards.WF_CC_ARCHIVING.s_WF_CC_ARCHIVING]
$$date=06/13/2016
```

Figure 9. parameter $$date from the parameter file

after that we are going to: Clean, validated data is stored in CREDIT_CARDS_CURRENT (Oracle)

CC_SUR	CC_NUMBER	CC_NUMBER_MASKED	CC_BALANCE	CC_LIMIT	CC_OPEN_DATE	ACCT_OPEN_DATE	EMP_NAME	EMP_EMAIL	EMP_DEPT_NAME
174	5542401766909580	554xxxxxxxxx588	1100	10292	3/12/2019	12/26/2016	Fatima Stevens	Proin.ultrices@nascetur.edu	Customer Support
194	5194140955854730	519xxxxxxxxx731	2109	13922	3/4/2019	9/22/2017	Alika Farley	id@velarcuCurabitur.com	HR
201	5514639048464010	551xxxxxxxxx013	3373	13544	2/25/2019	11/20/2015	Maggy Branch	nascetur.ridiculus@in.ca	Management
177	5119787082362830	511xxxxxxxxx830	4229	13930	1/18/2019	7/18/2015	Azalia Holden	Sed.auctor.odio@commodotinciduntnibh.co.uk	HR
202	4024007109518690	402xxxxxxxxx695	3684	13098	12/7/2018	9/10/2018	Ocean Walter	at@nisi.org	HR
173	5349776141045940	534xxxxxxxxx942	1191	11835	11/4/2018	8/1/2016	Hop Mclaughlin	amet.luctus@mattisornarelectus.edu	HR
188	4716061442691620	471xxxxxxxxx621	1805	10578	7/22/2018	8/30/2017	Liberty Reeves	lacus.Etiam@eusem.co.uk	Sales
209	5139609240718470	513xxxxxxxxx479	4704	10673	7/22/2018	9/17/2018	Zachary Lambert	Nullam@eleifendegestas.net	Management
186	5547757263657080	554xxxxxxxxx086	7888	14702	5/31/2018	7/2/2015	Alika Farley	id@velarcuCurabitur.com	HR
175	5386910325571240	538xxxxxxxxx241	6199	14934	4/3/2018	8/30/2017	Winifred Mckay	sed.est.Nunc@enimcommodo.org	Sales
210	5586308916693150	558xxxxxxxxx151	7049	10585	3/28/2018	5/22/2017	Abbot Townsend	urna.Vivamus@elementumdui.com	Sales
184	5312617852057130	531xxxxxxxxx135	7220	11218	2/7/2018	5/23/2017	Marvin Wood	justo.eu.arcu@AliquamnislNulla.co.uk	HR
189	5196305300407470	519xxxxxxxxx471	6566	11288	2/7/2018	4/29/2015	Vielka Potter	suscipit@lacinia.co.uk	Accounting
204	5276950009647360	527xxxxxxxxx365	1064	12375	2/5/2018	11/15/2018	Bruno Ingram	lobortis.quis@Aliquam.edu	Sales
195	5368489737490550	536xxxxxxxxx557	3750	11384	1/14/2018	1/16/2017	Jemima Fernandez	orci@Etiam.com	HR
207	5249508476639350	524xxxxxxxxx358	7474	11932	12/24/2017	1/6/2019	Illiana Mercado	Etiam.gravida.molestie@metusvitae.org	HR
212	5242955260828390	524xxxxxxxxx399	6534	13631	10/3/2017	4/4/2015	Murphy Sanchez	nulla.magna@magna.edu	Management
190	5321174583157910	532xxxxxxxxx916	5703	13600	7/11/2017	5/11/2017	Ocean Walter	at@nisi.org	HR
180	4532038562736820	453xxxxxxxxx826	7019	13117	7/8/2017	3/29/2017	Noble Watkins	vel.arcu.eu@ipsum.co.uk	Management
187	4024007100802720	402xxxxxxxxx726	5789	12566	5/1/2017	1/4/2019	Robin Johnston	non.quam.Pellentesque@eratsemperrutrum.org	Sales
193	4929794184461710	492xxxxxxxxx711	6290	14190	3/13/2017	11/30/2017	Tanek Stark	diam.nunc.ullamcorper@dictum.co.uk	Customer Support
182	5478055979374750	547xxxxxxxxx754	8335	12637	2/13/2017	10/13/2015	Kirsten Guerra	diam@pellentesquea.co.uk	Accounting
196	5155332236011530	515xxxxxxxxx531	6627	13378	1/12/2017	8/19/2015	Germane Owens	Integer@vitaealiquet.net	Customer Support
211	5131946861459220	513xxxxxxxxx225	7028	11824	11/27/2016	12/14/2018	Armando Mcfadden	Aliquam.auctor@lobortisquam.org	Accounting
215	5308209014525070	530xxxxxxxxx070	5660	11847	10/25/2016	10/13/2017	Coby Mueller	orci.quis.lectus@dignissimmagna.com	Management
200	5164152943737910	516xxxxxxxxx916	2883	10213	10/12/2016	9/24/2018	Zachary Lambert	Nullam@eleifendegestas.net	Management
208	5219690947242180	521xxxxxxxxx180	8953	14483	10/10/2016	7/7/2015	Forrest Frye	Donec.tempus@ipsum.edu	Sales
214	5136104812053820	513xxxxxxxxx821	6809	14379	9/24/2016	3/14/2017	Cyrus Ayers	molestie.pharetra@pharetra.net	Management
213	5534462721052370	553xxxxxxxxx377	8269	12784	8/31/2016	8/5/2015	Murphy Sanchez	nulla.magna@magna.edu	Management

Figure 10. CURRENT CREDIT CARDS table in DWH

Historical Data:

Older records are archived in CREDIT_CARDS_ARCHIVE (Oracle)

CC_SUR	CC_NUMBER	CC_NUMBER_MASKED	CC_BALANCE	CC_LIMIT	CC_OPEN_DATE	ACCT_OPEN_DATE	EMP_NAME	EMP_EMAIL	EMP_DEPT_NAME
178	5350190264027940	535xxxxxxxxx941	9647	14408	1/10/2015	1/5/2016	Cara Tucker	justo.Proin@FuscefeugiatLorem.org	Management
199	5157014007577430	515xxxxxxxxx431	4908	14628	5/1/2015	1/4/2019	Francesca Simpson	Aenean.euismod@Fusce.ca	Sales
185	4716976967330380	471xxxxxxxxx380	6882	12692	5/9/2015	5/30/2018	Sophia Cohen	id.mollis@estvitaesodales.com	Management
191	5509721291049170	550xxxxxxxxx175	2488	10831	6/10/2015	7/7/2015	Abbot Townsend	urna.Vivamus@elementumdui.com	Sales
203	5301388182789950	530xxxxxxxxx952	8532	13066	6/24/2015	9/17/2018	Mufutau Casey	vitae.aliquet@ligulaelitpretium.org	Management
192	4539926688800700	453xxxxxxxxx703	8240	14357	10/10/2015	2/25/2015	Vielka Potter	suscipit@lacinia.co.uk	Accounting
197	4916815611928010	491xxxxxxxxx017	1988	12726	11/18/2015	4/4/2015	Leo Vasquez	Mauris.non@tempuslorem.edu	Accounting
181	5381573488987190	538xxxxxxxxx193	7258	10483	1/16/2016	11/1/2015	Ima Parks	nibh.lacinia.orci@commodotinciduntnibh.ca	Customer Support
205	4793917364771790	479xxxxxxxxx798	3940	13320	1/25/2016	3/19/2016	Maryam Perry	gravida.nunc@ipsum.ca	Sales
176	5435592923432740	543xxxxxxxxx744	7791	13216	1/28/2016	2/21/2016	Noble Watkins	vel.arcu.eu@ipsum.co.uk	Management
179	5299182789956060	529xxxxxxxxx062	4771	12135	1/29/2016	3/9/2018	Forrest Frye	Donec.tempus@ipsum.edu	Sales
206	5343414930198300	534xxxxxxxxx302	1659	14966	2/3/2016	7/31/2018	Liberty Reeves	lacus.Etiam@eusem.co.uk	Sales
183	5137466517447640	513xxxxxxxxx643	2899	10485	4/5/2016	8/16/2017	Craig Skinner	eu.euismod.ac@euaugue.org	Sales
198	4929506237611880	492xxxxxxxxx880	1013	11123	5/1/2016	8/1/2016	Fatima Stevens	Proin.ultrices@nascetur.edu	Customer Support

Figure 11. ARCHIVED CREDIT CARDS table in DWH

Exception Handling

Rejected records are quarantined in the REJECTED_DATA flat file

Automated alerts are generated for records failing validation
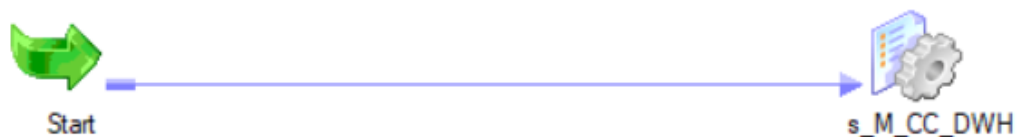
Data Work-Flow Diagram

Figure 12. "WF_CC_DWH" WORKFLOW FOR LOADING ALL CREDIT CARDS DATA in DWH

Figure 13. "WF_CC_ARCHIVING" WORKFLOW FOR ARCHIVING HISTORICAL DATA

Data Orchestration

The File Watcher service actively monitors predefined directories for incoming credit card data files. Upon detection, it initiates the event wait to be ready for next step in the workflow.