DATABASE MANAGEMENT
MIST.6030 (SECTION 201), FALL 2019
FINAL TEAM PROJECT

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Business Background

Aras Corporation is a PLM Company headquartered in Andover,Ma. As PLM stands for Product Lifecycle Management, the company sells its software, Innovator, as a service to large and medium sized corporations who use the software as a method of managing one or many products and its data over the life of the product from inception to decommission in an effort to make better business decisions. They have offices all over the world including Japan, United Kingdom, Germany, France, and Italy. These offices together have about 500 employees. Some of the companies that use Aras' software are GE Aviation, General Motors, BAE Systems, Microsoft, and Honda. Some of Aras' competitors are Siemens, PTC, Dassault Systems, and Oracle.

Database Purpose

As we met with Jillian a business analyst at Aras, we discussed the objective of this project and how we could help Aras. We struggled at first to find problems that we could help solve because the company uses their own software, Innovator, as a database and they tailor it to their needs. The software is so easy to use that you can upload and change data instantly, add attributes and rules in an instant as well. So there almost wasn't much we could do for Aras. But in our discussions we came across a problem we could help with.

Aras' customers are very big companies like Microsoft and GE Aviation. Each of these large corporations have slightly smaller companies within them. At this moment Aras' database is not able to view companies within companies. So our task was to find a way to roll up all of the companies that belong to a bigger company under that bigger company. Additionally, employees need to be able to view contacts within each company, see the sales rep assigned to the companies, and sales opportunities associated with each account.

Business Rules:
- Every account is either a stand alone account or an enterprise account
- An enterprise account can have none or many stand alone accounts
- An account can have none or many contacts and each contact is only associated with one account
- A sales rep may or may not have an opportunity, however they could have many opportunities.
- An opportunity must be associated with one and only one sales rep
- An opportunity type can be a new sale, renewal, or expansion
- A sales rep can manage none or many accounts, an account can be managed by none or only one sales rep
- For every account there can only be one opportunity
- Contacts should include name, phone number, email, job title, and job role
- Accounts should include name, state, city, ctreet, zip code

- Information on Sales Representatives should include name, region, and phone number
- Information on Opportunity should include opportunity open date, opportunity close date

ER Diagram
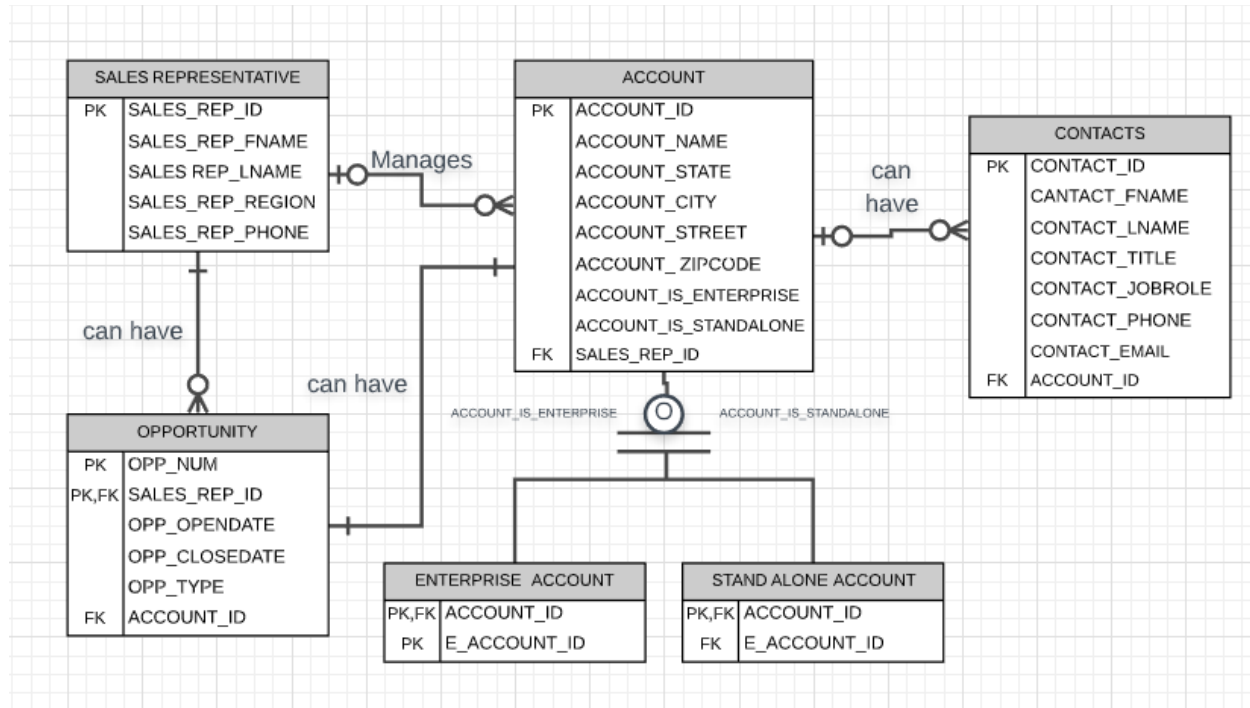
Relational Schema
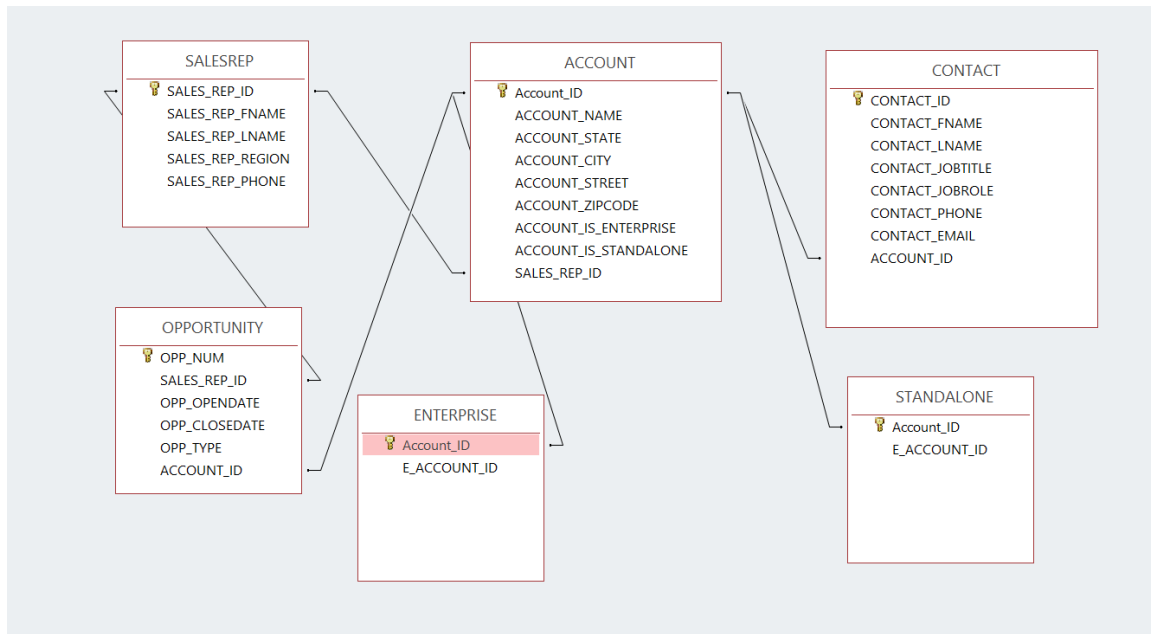
Database Tables

We created 6 tables in total, one for each entity(SALESREP for the Sales Representative entity, ACCOUNT for the ACCOUNT entity, OPPORTUNITY for the OPPORTUNITY entity, CONTACT for the CONTACT entity, ENTERPRISE for the ENTERPRISE ACCOUNT entity, and STANDALONE for the STANDALONE ACCOUNT entity. Screenshots of each table are displayed below.

ACCOUNT

Account_	ACCOUNT_NAME	ACCOUNT_STATE	ACCOUNT_CITY	ACCOUNT_STREET	ACCOUNT_ZIPCODE	ACCOUNT_IS_ENTERPRISE	ACCOUNT_IS_STANDALONE	SALES_REP
1 Lycos	AK	Fairbanks	P.O. Box 784, 2364 Fermentum Rd.	99897	No	Yes	1
2 Microsoft	MT	Billings	8710 Vel, St.	28503	Yes	Yes	2
3 Yahoo	VT	Rutland	P.O. Box 328, 843 Ut Rd.	95292	Yes	No	3
4 Lycos	OR	Gresham	Ap #416-7153 Sit Street	54883	No	Yes	2
5 Macromedia	FL	Jacksonville	P.O. Box 785, 3947 Fusce St.	99262	No	No	5
6 Sibelius	CA	San Jose	Ap #127-6888 Quis Av.	91637	No	Yes	6
7 Altavista	MT	Bozeman	P.O. Box 304, 3435 Dictum Ave	69134	Yes	No	7
8 Lavasoft	MO	Kansas City	P.O. Box 566, 2948 Purus. Avenue	51315	No	yes	8
9 Google	IL	Joliet	748-6870 Sagittis Road	12774	No	No	9
10 Apple Systems	TX	Austin	P.O. Box 656, 9004 Enim. Rd.	94678	Yes	Yes	10
11 Microsoft Azure	NH	Concord	1 America dr.	3301	No	Yes	1
12 Microsoft Office	MA	Boston	2 America st.	2218	No	Yes	2
13 Microsoft Web	CT	Hartford	3 America ln.	6101	No	Yes	3
14 Yahoo Sports	CA	Beverly Hills	4 America circle	90210	No	Yes	4
15 Yahoo Finance	FL	Orlando	5 America dr.	32789	No	Yes	5
16 Yahoo Shopping	NY	New York City	6 America st.	10001	No	Yes	6
17 Apple Iphone	WA	Seattle	7 America Ln.	98101	No	Yes	7
18 Apple Mac	CA	Anahiem	8 America circle	92801	No	Yes	8

SALESREP

SALES_REP_ID	SALES_REP_FNAME	SALES_REP_LNAME	SALES_REP_REGION	SALES_REP_PHONE
1	Armando	Colon	USA	(734) 128-8685
2	Lyle	Holloway	USA	(363) 644-1444
3	Nissim	Shaw	USA	(567) 839-2661
4	Imogene	Hunt	USA	(570) 119-2894
5	Hanae	Booth	USA	(657) 965-9593
6	Vielka	Emerson	USA	(929) 388-5752
7	Phelan	Shepherd	USA	(664) 410-4978
8	Nicole	Osborne	USA	(357) 184-7718
9	Ingrid	Eaton	USA	(741) 586-3430
10	Regan	Thornton	USA	(820) 208-4115

ENTERPRISE

Account_ID	E_ACCOUNT_ID
2	100
3	101
7	102
10	103

STANDALONE

Account_ID	E_ACCOUNT
1	
2	
4	
6	
8	
10	
11	100
12	100
13	100
14	101
15	101
16	101
17	103
18	103

CONTACT

CONTACT_ID	CONTACT_FNAME	CONTACT_LNAME	CONTACT_JOBTITLE	CONTACT_JOBROLE	CONTACT_PHONE	CONTACT_EMAIL	ACCOUNT_ID
1001	Dennis	Bright	Research and Development Specialist	Research and Development	1-966-413-8580	Dbright@lycos.com	1
1002	Yardley	Jimenez	Market Research Analyst	Research and Development	1-527-907-7927	Yjimenez@Microsoft.com	2
1003	Aline	England	Research Data Analyst	Research and Development	1-472-874-4772	Aengland@Yahoo.com	3
1004	Arden	Perry	Asset Manager	Asset Management	1-825-475-4561	Aperry@lycos.com	1
1005	Inez	Johnson	Presale Engineer	Engineering	1-772-605-4898	Ijohnson@macromedia.com	5
1006	Nathaniel	Snyder	Procurement Manager	Sales	1-276-606-4667	Nsnyder@sibelius.com	6
1007	Alfonso	Chang	Systems Engineer	Engineering	1-848-321-2184	Achang@altavista.com	7
1008	Kiona	Sanders	Accountant	Accounting	1-306-961-0733	Ksanders@lavasoft.com	8
1009	Desirae	Stark	Data Quality Analyst	Quality Assurance	1-321-208-3496	Dstark@google.com	9
1010	Katelyn	Mccoy	Marketing Specialist	Marketing	1-910-696-7877	Kmccoy@apple.com	10
1011	George	Smith	Chief Engineering Officer	Engineering	1-234-835-9023	gsmith@microsoft.com	11
1012	Jerry	Lacome	Research and Development Manager	Research and Development	1-764-385-0937	jlacone@microsoft.com	12
1013	Samantha	Rivers	Quality Assurance Manager	Quality Assurance	1-378-639-1034	sriver@microsoft.com	13
1014	Fionna	Masterson	Presale Engineer	Engineering	1-329-365-0478	fmasterson@yahoo.com	14
1015	Steve	Flores	VP Research and Development	Research and Development	1-294-256-3950	sflores@yahoo.com	15
1016	Rob	Himenez	Quality Assurance Associate	Quality Assurance	1-974-657-3905	rhimenez@apple.com	17

OPPORTUNITY

OPP_NUM	SALES_REP_ID	OPP_OPENDATE	OPP_CLOSEDATE	OPP_TYPE	ACCOUNT_ID
11001	1	2018-12-04 12:05:05	2020-08-28 23:16:55	new sale	1
11002	2	2019-03-10 23:39:44	2020-01-28 16:52:36	expansion	2
11003	3	2019-11-22 15:43:02	2020-09-06 08:25:39	new sale	3
11004	4	2019-07-26 13:31:50	2020-01-28 23:29:39	new sale	4
11005	5	2019-03-23 01:06:38	2020-05-08 01:58:11	expansion	5
11006	6	2018-12-03 08:21:44	2019-12-05 15:14:34	new sale	6
11007	7	2018-12-11 16:28:42	2020-05-10 08:43:41	renewal	7
11008	3	2019-05-13 17:42:32	2020-09-22 12:19:03	expansion	8
11009	9	2019-06-26 11:15:31	2019-12-25 23:53:37	renewal	9
11010	5	2019-03-15 19:11:05	2020-02-11 01:37:34	new sale	10
11011	1	2019-03-15 19:11:06	2020-02-11 01:37:35	expansion	11
11012	2	2019-03-15 19:11:07	2020-02-11 01:37:36	renewal	12
11013	3	2019-03-15 19:11:08	2020-02-11 01:37:37	new sale	13
11014	4	2019-03-15 19:11:09	2020-02-11 01:37:38	expansion	14
11015	5	2019-03-15 19:11:10	2020-02-11 01:37:39	renewal	15
11016	6	2019-03-15 19:11:11	2020-02-11 01:37:40	new sale	16
11017	7	2019-03-15 19:11:12	2020-02-11 01:37:41	expansion	17
11018	8	2019-03-15 19:11:13	2020-02-11 01:37:42	renewal	18

Creating the Tables and Loading the Data

We started creating our tables programmatically using the Create table function on sql. Then we continued by identifying our keys (Primary and Foriegn) and establishing relationships. Then we loaded our data using the INSERT function. We created some of our tables programmatically and created the rest automatically by uploading them. This was due to the size of the dataset and the time constraint we faced.

Queries & Results

Query 1: Display every account name and the sales rep belonging to the account.

SQL Code:
SELECT ACCOUNT.ACCOUNT_NAME, SALESREP.SALES_REP_FNAME
FROM SALESREP INNER JOIN ACCOUNT ON SALESREP.SALES_REP_ID =
ACCOUNT.SALES_REP_ID;

OUTPUT:

ACCOUNT_NAME	SALES_REP_FNAME
Lycos	Armando
Microsoft Azure	Armando
Microsoft	Lyle
Lycos	Lyle
Microsoft Office	Lyle
Yahoo	Nissim
Microsoft Web	Nissim
Yahoo Sports	Imogene
Macromedia	Hanae
Yahoo Finance	Hanae
Sibelius	Vielka
Yahoo Shopping	Vielka
Altavista	Phelan
Apple Iphone	Phelan
Lavasoft	Nicole
Apple Mac	Nicole
Google	Ingrid
Apple Systems	Regan

Query 2: Display every account name and contacts first name and job title within each account. Sort by account name in ascending order.

SQL Code:
SELECT ACCOUNT.ACCOUNT_NAME, CONTACT.CONTACT_FNAME,
CONTACT.CONTACT_JOBTITLE
FROM ACCOUNT INNER JOIN CONTACT ON ACCOUNT.Account_ID =
CONTACT.ACCOUNT_ID
ORDER BY ACCOUNT.ACCOUNT_NAME;

OUTPUT:

ACCOUNT_NAME ▼	CONTACT_FNAME ▼	CONTACT_JOBTITLE ▼
Altavista	Alfonso	Systems Engineer
Apple Iphone	Rob	Quality Assurance Associate
Apple Systems	Katelyn	Marketing Specialist
Google	Desirae	Data Quality Analyst
Lavasoft	Kiona	Accountant
Lycos	Dennis	Research and Development Specialist
Lycos	Arden	Asset Manager
Macromedia	Inez	Presale Engineer
Microsoft	Yardley	Market Research Analyst
Microsoft Azure	George	Chief Engineering Officer
Microsoft Office	Jerry	Research and Development Manager
Microsoft Web	Samantha	Quality Assurance Manager
Sibelius	Nathaniel	Procurement Manager
Yahoo	Aline	Research Data Analyst
Yahoo Finance	Steve	VP Research and Development
Yahoo Sports	Fionna	Presale Engineer

Query 3: Display every account name, the sales rep first name belonging to the account, the opportunity number, opportunity open and close date, as well as the opportunity type. Sort by account name in ascending order.

SQL Code:
```
SELECT ACCOUNT.ACCOUNT_NAME, SALESREP.SALES_REP_FNAME,
OPPORTUNITY.OPP_NUM, OPPORTUNITY.OPP_OPENDATE,
OPPORTUNITY.OPP_CLOSEDATE, OPPORTUNITY.OPP_TYPE
FROM (SALESREP INNER JOIN ACCOUNT ON SALESREP.SALES_REP_ID =
ACCOUNT.SALES_REP_ID) INNER JOIN OPPORTUNITY ON (SALESREP.SALES_REP_ID
= OPPORTUNITY.SALES_REP_ID) AND (ACCOUNT.Account_ID =
OPPORTUNITY.ACCOUNT_ID)
ORDER BY ACCOUNT.ACCOUNT_NAME;
```

OUTPUT:

ACCOUNT_N ▼	SALES_REP_F ▼	OPP_NUM ▼	OPP_OPENDATE ▼	OPP_CLOSEDATE ▼	OPP_TYPE ▼
Altavista	Phelan	11007	2018-12-11 16:28:42	2020-05-10 08:43:41	renewal
Apple Iphone	Phelan	11017	2019-03-15 19:11:12	2020-02-11 01:37:41	expansion
Apple Mac	Nicole	11018	2019-03-15 19:11:13	2020-02-11 01:37:42	renewal
Google	Ingrid	11009	2019-06-26 11:15:31	2019-12-25 23:53:37	renewal
Lycos	Armando	11001	2018-12-04 12:05:05	2020-08-28 23:16:55	new sale
Macromedia	Hanae	11005	2019-03-23 01:06:38	2020-05-08 01:58:11	expansion
Microsoft	Lyle	11002	2019-03-10 23:39:44	2020-01-28 16:52:36	expansion
Microsoft Azur	Armando	11011	2019-03-15 19:11:06	2020-02-11 01:37:35	expansion
Microsoft Offic	Lyle	11012	2019-03-15 19:11:07	2020-02-11 01:37:36	renewal
Microsoft Web	Nissim	11013	2019-03-15 19:11:08	2020-02-11 01:37:37	new sale
Sibelius	Vielka	11006	2018-12-03 08:21:44	2019-12-05 15:14:34	new sale
Yahoo	Nissim	11003	2019-11-22 15:43:02	2020-09-06 08:25:39	new sale
Yahoo Finance	Hanae	11015	2019-03-15 19:11:10	2020-02-11 01:37:39	renewal
Yahoo Shoppin	Vielka	11016	2019-03-15 19:11:11	2020-02-11 01:37:40	new sale
Yahoo Sports	Imogene	11014	2019-03-15 19:11:09	2020-02-11 01:37:38	expansion

Query 4: Display account id, opportunity number, and opportunity type. Sort by opportunity number then by account id in ascending order.

SQL Code:

OUTPUT:

	ACCOUNT_ID	OPP_NUM	OPP_TYPE
▶	1	11001	new sale
	2	11002	expansion
	3	11003	new sale
	4	11004	new sale
	5	11005	expansion
	6	11006	new sale
	7	11007	renewal
	8	11008	expansion
	9	11009	renewal
	10	11010	new sale
	11	11011	expansion
	12	11012	renewal
	13	11013	new sale
	14	11014	expansion
	15	11015	renewal
	16	11016	new sale
	17	11017	expansion
	18	11018	renewal

Query 5: Display all of the stand alone account names under an enterprise account and the enterprise account name. Order by standalone account name in ascending order.

SQL Code:
SELECT ACCOUNT.ACCOUNT_NAME, [ENTERPRISE LIST].ACCOUNT_NAME
FROM [ENTERPRISE LIST], STANDALONE INNER JOIN ACCOUNT ON
STANDALONE.Account_ID = ACCOUNT.Account_ID
WHERE (((STANDALONE.E_ACCOUNT_ID)=[ENTERPRISE LIST].[E_ACCOUNT_ID]))
ORDER BY ACCOUNT.ACCOUNT_NAME;

Note: in this query we made another table called enterprise list that contained account name and e_account_id that corresponded to the account name

OUTPUT:

ACCOUNT.ACCOUNT_NAME	ENTERPRISE LIST.ACCOUNT_NAME
Apple Iphone	Apple Systems
Apple Mac	Apple Systems
Microsoft Azure	Microsoft
Microsoft Office	Microsoft
Microsoft Web	Microsoft
Yahoo Finance	Yahoo
Yahoo Shopping	Yahoo
Yahoo Sports	Yahoo

Conclusion & Lessons Learned

This project was a great learning experience for us. The initial purpose and objective proved to be a difficult one as Jillian said it might take some time to think about. In making dummy data we discovered that there was so much information and attributes we could have included in each table but for simplicity we decided to trim the data down. Another lesson learned was in trying to "roll up" the accounts. There were several ways to do this and each seemed to be a difficult and gruesome task. We came to a point where we were able to make another table consisting of the enterprise account information to help create a list of each account and their enterprise account. Overall this project was a success. With Jillian's help we were able to find a solution to her problem and was satisfied with our work.