MSc in Financial Markets with Information Systems

Relational Database Design Coursework
ECP039C

Portfolio Management System
Campbell Associates Ltd

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Introduction

The following analysis is concerning the business model of a Portfolio Management System developed by Campbell Associate Ltd, which is a small London-based software company specialising in Financial Systems products. A new requirements has arisen for designing a simple system that tracks personal net worth and summarises investment history that can then be used as a guide for future investment decisions.

Requirements:

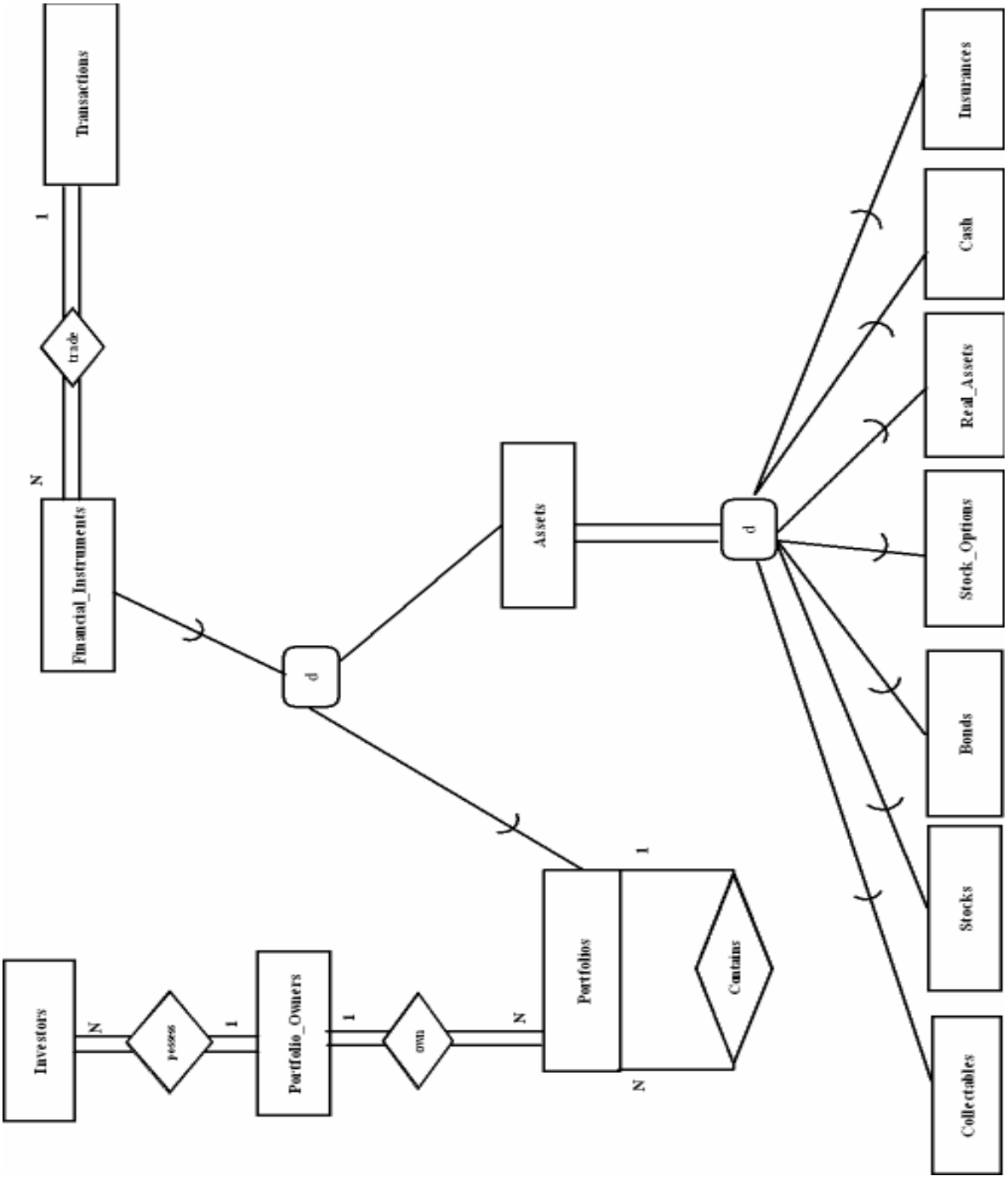
1. The system will focus on stock and bond investments, but should be able to add other kinds of financial instruments as future extensions.
2. The system should permit mixture of assets and liabilities, including bonds, stocks, options, commodities, mutual funds, precious metals, collectables, cash, insurance, real estate, and loans.
3. A financial instrument is an asset, liability, or portfolio
4. Portfolios themselves contain financial instruments
5. A portfolio may be owned by multiple persons and may be held by some financial institution.
6. Asset value may be actual or estimated
7. Stocks trade on various exchanges thought-out the world that establish current value. There are different types of stock (such as common, preferred and etc).
8. Transaction is a trade of one collection of assets for another collection of assets. The transaction is the only mechanism for changing assets in a portfolio

Assumptions:

1. The system will focus only on stock and bond investments
2. The stocks have a single ticker symbol across all exchanges
3. A single $US currency is used by both actual and estimated sources
4. There are two kind of investors private investors and corporate institutions
5. The private investor in our case Mark Campbell owns two portfolios main portfolio is a stock portfolio called “JAN IRA” with portfolio id 100 and sub – portfolio which is a bond portfolio called “FEB BOND” with portfolio id 120. Main and sub stock portfolios are partially owned by other private investor too according the requirements.
6. The corporate investor in our case “Mark’s Bank Plc” holds two portfolios main portfolio is a collection of stocks called “JAN PRS” preferred shares with portfolio id 110 and sub portfolio which is basket of bonds called “MAR BOND” with portfolio id 130.
7. Every portfolio has portfolio id and parent portfolio id, where in the main portfolios - the portfolio id and parent portfolio id are the same, and for sub different.
8. The transaction fee is usually registered for a single asset which includes the transaction cost plus commissions and in our case we have two transaction ids 19 and 20, which have registered two assets for each transaction, so to find the transaction cost for each asset we calculate the average fee ignoring the % weight of the assets within the transaction.

Section 1 Extended Entity-Relationship

This is the Extended Entity-Relationship model of Portfolio Management System based on the above requirements and assumptions. The EER model includes all the concepts of the original ER model and the concepts of generalization/specialization. Generalizations and specializations are associated with the concepts of super classes and sub-classes and attribute inheritance. Chen notation has been used in the model.
We have one super class Financial Instruments , super and sub class Assets and the rest of sub-classes. There is a composition relationship between Portfolios and Assets which has been ignored and has been developed on the base of ER model.



Section 2 Normalization

Stock Asset Information Screen

UNF

STOCKS (ticker_sym, s_asset_name, descr, type,
(date, value, currency, source)*)

1NF

STOCKS -1 (ticker_sym, s_asset_name, descr, type)

STOCKS_TV – 1 (ticker_sym, date, source, value, currency)

The outermost repeating group is removed and a new relation is created and its primary key copied into newly formed First Normal Form entities. After the 1NF treatment, there are no repeating groups in the STOCKS. Now, the non-key attributes will be checked against their dependency on the primary key. Full dependency is required to 2NF. Also any functional dependencies will be moved to a new relation.

2NF

STOCKS -2 (ticker_sym, s_asset_name, descr, type)

STOCKS_TV – 2 (ticker_sym, date, source, value)

STOCKS_CUR – 2 (ticker_sym, source, currency)

We make an assumption that the symbol ticker of a stock can be the same across all exchanges can be quoted in different currency and the source - (actual and estimated) can be made available in different currency too. So the conclusion is the currency depends on stock symbol and the source provided.

To conform with 3NF, any possible transitive dependencies on non-key attributes need to be removed into new relation.

3NF

STOCKS -3 (ticker_sym, s_asset_name, descr, type)

STOCKS_TV – 3 (ticker_sym, date, source, value)

STOCKS_CUR – 3 (ticker_sym, source, currency)

That completes the 3NF, as there are no any possible transitive dependencies on non-key attributes the 2NF and 3NF are the same.
For simplicity in our project we will assume that the stock and the source provided are in only $US, so we will create our tables on the stocks demoralised back to 1NF.

Transaction Information Screen

UNF

TRANSACTIONS (trans_date, rec_date, descr, type, fee, currency, port_account
(name, qty)*, add_asset, del_asset)

Name and Quantity is clearly a repeating group and therefore needs to be separated.

1NF

TRANSACTIONS -1 (trans_date, rec_date, descr, type, fee, currency, port_account,
add_asset, del_asset)

TRANSACTIONS_ DEL_ADD – 1 (trans_date, rec_date, type, name, qty)

2NF

TRANSACTIONS -2 (trans_date, rec_date, descr, type, fee, currency, port_account)

TRANSACTIONS_ NQ – 2 (type, add_asset, del_asset)

TRANSACTIONS_ DEL_ADD – 2 (trans_date, rec_date, type, name, qty)

After handling the partial dependencies as above the normalisation process can be resumed with 3NF where transitive dependencies will be the focus area:

3NF

The above tables are already in £NF and no further treatment is needed:

TRANSACTIONS -3 (trans_date, rec_date, descr, type, fee, currency, port_account)

TRANSACTIONS_ NQ – 3 (type, add_asset, del_asset)

TRANSACTIONS_ DEL_ADD – 3 (trans_date, rec_date, type, name, qty)

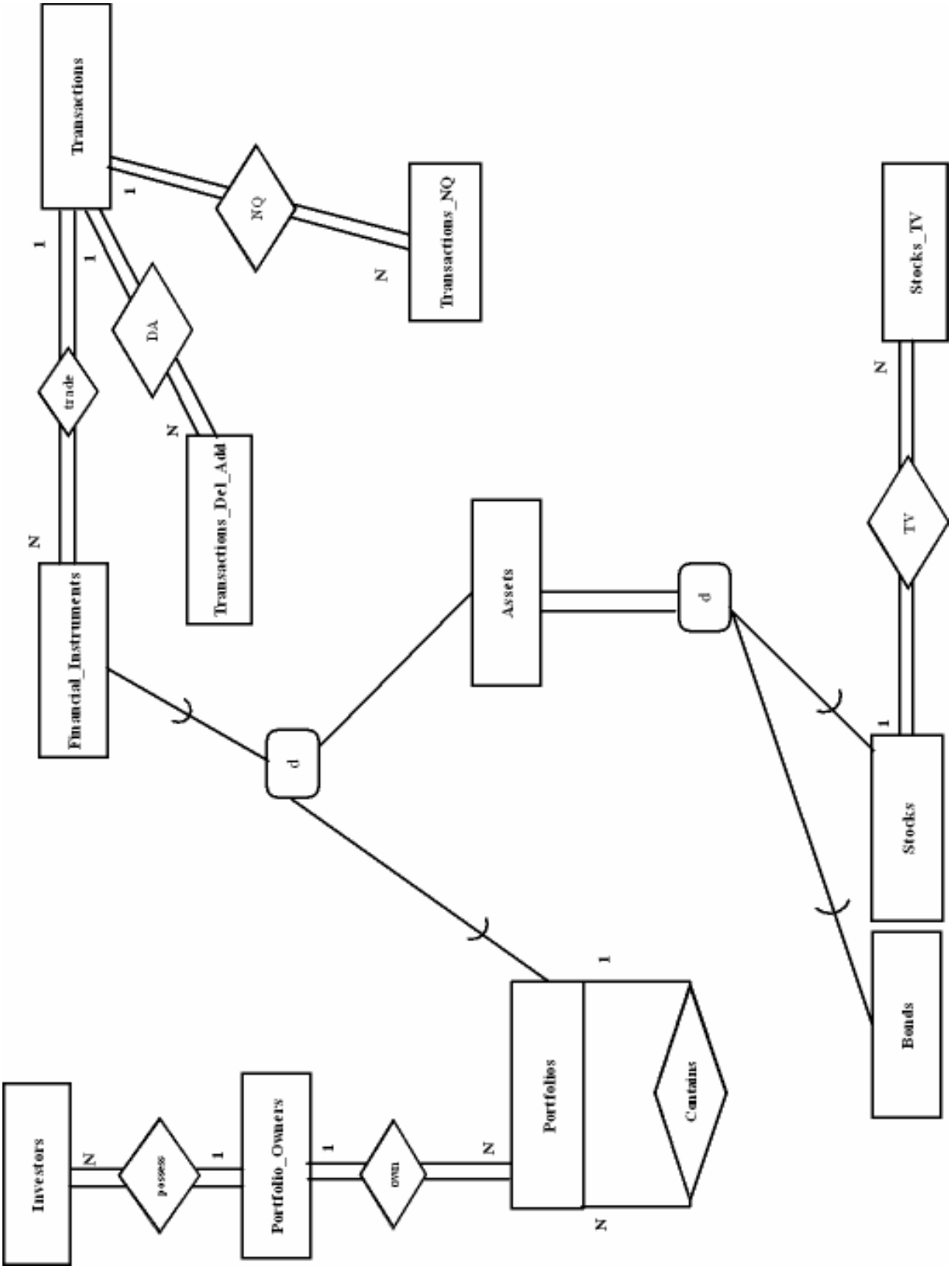
Stock Asset Information Screen

UNF	1NF	2NF	3NF
1 ticker_sym	ticker_sym	ticker_sym	(STOCKS)
1 st_asset_name	st_asset_name	st_asset_name	ticker_sym
1 descr	descr	descr	st_asset_name
1 type	type	type	Descry
2 date			Type
2 value	ticker_sym	ticker_sym	
2 currency	date	date	(STOCKS_TV)
2 source	source	source	ticker_sym
	value	value	Date
	currency		Source
		ticker_sym	Value
		source	
		currency	(STOCKS_CUR)
			ticker_sym
			Source
			Currency

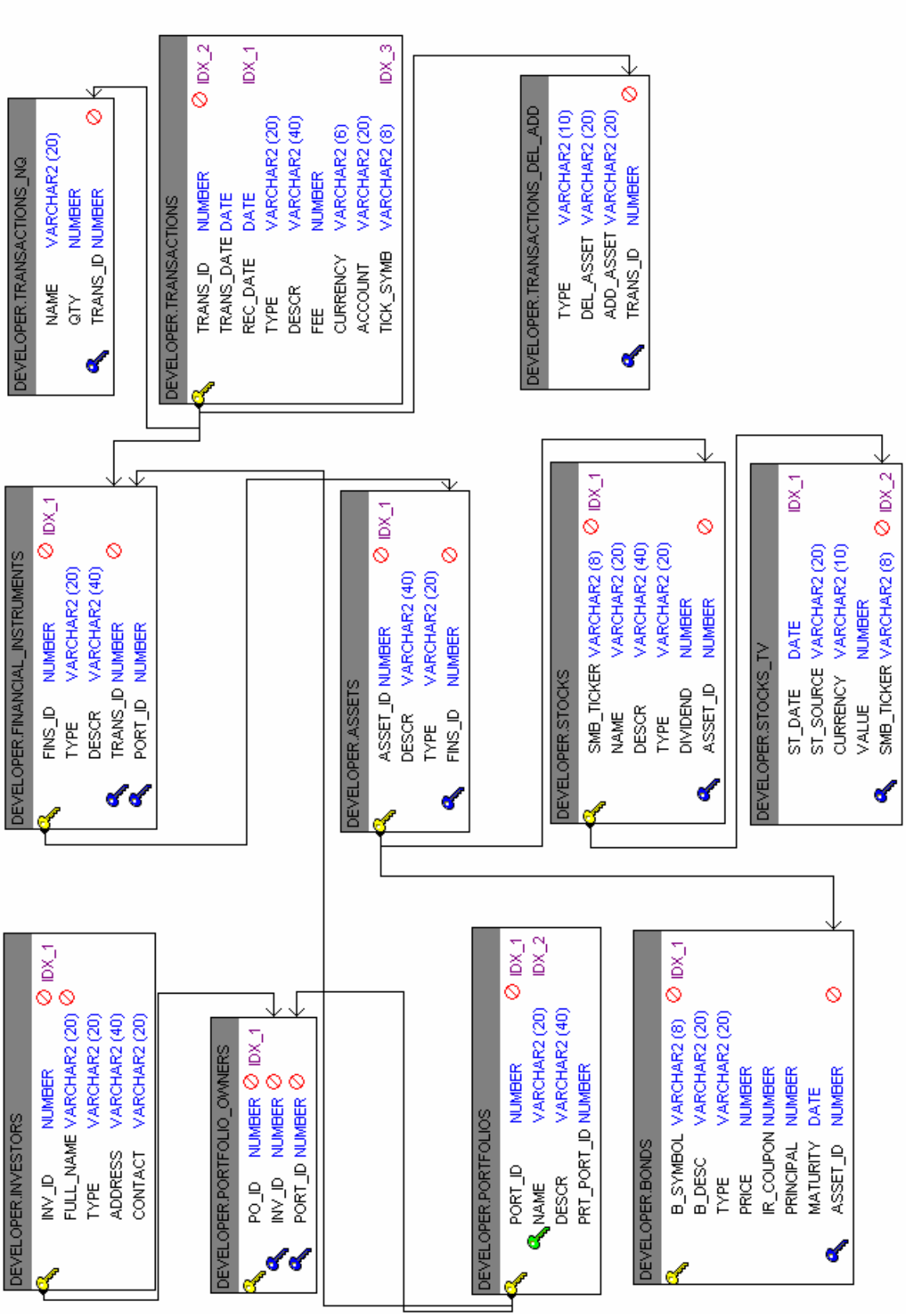
Transaction Information Screen

UNF	1NF	2NF	3NF
1 trans_date	trans_date	trans_date	(TRANSACTIONS)
1 rec_date	rec_date	rec_date	trans_date
1 descr	descr	descr	rec_date
1 type	type	type	Descry
1 fee	fee	fee	Type
1 currency	currency	currency	Fee
1 port_account	port_account	port_account	Currency
1 add_asset	add_asset		port_account
1 del_asset	del_asset	type	
2 name		add_asset	(TRANSACTIONS_DEL_ADD)
2 qty	trans_date	del_asset	Type
	rec_date		add_asset
	type	trans_date	del_asset
	name	rec_date	
	qty	type	(TRANSACTIONS_NQ)
		name	trans_date
		qty	rec_date
			Type
			Name
			Qty

Based on the above assumptions and the new requirements of the Stock Asset Information Screen and Transaction Information Screen after the normalisation we get a new EER model normalised to 3NF.



This is the physical ER Model based on our logical EER model, showing it as a reference.



Section 3 Creation of physical database

First we should create the main tables with their constraints followed by the detail dependent tables with their referential constraints.
The tables will be created and populated with following SQL statements, respectively

- **TRANSACTIONS Table**

  Assumptions:
  1. transaction types used portfolio, purchase, sale, interest, principal

```
CREATE TABLE TRANSACTIONS
(
  TRANS_ID    NUMBER                          NOT NULL,
  TRANS_DATE  DATE,
  REC_DATE    DATE,
  TYPE        VARCHAR2(20 BYTE),
  DESCR       VARCHAR2(40 BYTE),
  FEE         NUMBER,
  CURRENCY    VARCHAR2(6 BYTE),
  ACCOUNT     VARCHAR2(20 BYTE)
);

CREATE INDEX INDX_REC_DATE ON TRANSACTIONS (REC_DATE);

CREATE UNIQUE INDEX PK_TRANSACTIONS ON TRANSACTIONS (TRANS_ID);

CREATE PUBLIC SYNONYM TRANSACTIONS FOR TRANSACTIONS;

ALTER TABLE TRANSACTIONS ADD (
CONSTRAINT PK_TRANSACTIONS PRIMARY KEY (TRANS_ID));

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
11,  TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'portfolio', 'Create JAN IRA portfolio account', NULL, 'USD', 'JAN
IRA account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
12,  TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'portfolio', 'Create JAN PRS account', NULL, 'USD', 'JAN PRS
account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
13,  TO_Date( '02/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '02/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'portfolio', 'Create Bond account', NULL, 'USD', 'FEB Bond
account');


INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
14,  TO_Date( '03/01/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/01/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'portfolio', 'Create Bond account', NULL, 'USA', 'MAR Bond
account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
```

```
1,  TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'purchase price $18 per share for IBM', 95, 'USD', 'JAN
IRA account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
2,  TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'purchase price $20 per share for Enron', 120, 'USD',
'JAN PRS account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
3,  TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'purchase price $19 per share for ORCL', 100, 'USD',
'JAN IRA account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
4,  TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'purchase price $20 per share for VOD', 80, 'USD', 'JAN
IRA account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
5,  TO_Date( '02/10/1985 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '04/16/1985 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'principal', ' 6% FNMA Corporate bond for 10m 03/05', NULL, 'USD',
'FEB Bond account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
6,  TO_Date( '02/09/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '02/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'interest', '10% Intern Bond Ford for 20m 09/12', NULL, 'USD', 'FEB
Bond account');


INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
7,  TO_Date( '03/01/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/01/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'sale', 'sale price $16 per share for IBM', 75, 'USD', 'JAN IRA
account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
8,  TO_Date( '03/19/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'interest', 'int rate 10% on News Co corp bond 10m', NULL, 'USD',
'FEB Bond account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
9,  TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'interest', '10% Intern Bond Boeng for 20m 09/17', NULL, 'USD',
'FEB Bond account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
10,  TO_Date( '03/20/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'dividend', '0.5 div on Finove share volume 1200', NULL, 'USD',
'JAN IRA account');
```

```
INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
15,  TO_Date( '03/03/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/04/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'interest', '8% UK Gild', NULL, 'USD', 'MAR Bond account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
16,  TO_Date( '03/17/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/18/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'sale', '10% Intern Bond Ford for 20m 09/12', 200, 'USD', 'FEB Bond
account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
17,  TO_Date( '03/15/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/16/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'principal', '7.25% CWE corporate bond 05/08', NULL, 'USD', 'MAR
Bond account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
18,  TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'purchase price $12 per share on Apache ', 70, 'USD',
'JAN PRS account');

INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
19,  TO_Date( '01/12/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'AIM @ $69 and A A R CP  @ $12.75', 130, 'USD', 'JAN
IRA account');


INSERT INTO TRANSACTIONS ( TRANS_ID, TRANS_DATE, REC_DATE, TYPE,
DESCR, FEE, CURRENCY,ACCOUNT ) VALUES (
20,  TO_Date( '01/10/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'),
TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM')
, 'purchase', 'DPL INC @ $25.13 and HIA INC @ $0.47', 90, 'USD', 'JAN
PRS account');
```

- **TRANSACTIONS_DEL_ADD Table**

```
CREATE TABLE TRANSACTIONS_DEL_ADD
(
  TYPE       VARCHAR2(10 BYTE),
  DEL_ASSET  VARCHAR2(20 BYTE),
  ADD_ASSET  VARCHAR2(20 BYTE),
  TRANS_ID   NUMBER             NOT NULL
);

CREATE PUBLIC SYNONYM TRANSACTIONS_DEL_ADD FOR TRANSACTIONS_DEL_ADD;

ALTER TABLE TRANSACTIONS_DEL_ADD ADD (
  CONSTRAINT FK_TRANSACTIONS FOREIGN KEY (TRANS_ID)
    REFERENCES TRANSACTIONS (TRANS_ID));

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('withdrawal', 'IBM', NULL, 7);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'VOD', 4);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'IBM', 1);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
```

```
TRANS_ID ) VALUES ('deposit', NULL, 'ENRON', 2);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'ORCL', 3);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'FNMA', 5);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'FORD', 6);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'NEWS', 8);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'BOENG', 9);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'UKGild', 15);


INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('withdrawal', 'Ford', NULL, 16);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'CWE', 17);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'APACHE', 18);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('dividend', NULL, 'FINOVE', 10);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'AIM', 19);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'AAR', 19);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'DPL', 20);

INSERT INTO TRANSACTIONS_DEL_ADD ( TYPE, DEL_ASSET, ADD_ASSET,
TRANS_ID ) VALUES ('deposit', NULL, 'HIAI', 20);
```

- **TRANSACTIONS_NQ Table**

```
CREATE TABLE TRANSACTIONS_NQ
(
  NAME         VARCHAR2(20 BYTE),
  QTY          NUMBER,
  TRANS_ID     NUMBER                           NOT NULL,
  SMB_TICKER   VARCHAR2(8 BYTE)                 NOT NULL
);

CREATE PUBLIC SYNONYM TRANSACTIONS_NQ FOR TRANSACTIONS_NQ;

ALTER TABLE TRANSACTIONS_NQ ADD (
  CONSTRAINT FK_TRANSACTIONS_NQ FOREIGN KEY (TRANS_ID)
    REFERENCES TRANSACTIONS (TRANS_ID));

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('IBM', 500, 1, 'IBM');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('ENRON', 100, 2, 'ENRON');
```

```
INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('Oracle', 300, 3, 'ORCL');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('Vodafone', 50, 4, 'VOD');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('IBM', -200, 7, 'IBM');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('Finove', 1200, 10, 'FINOVE');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('Apache', 100, 18, 'APACHE');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('AIM', 40, 19, 'AIM');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('AAR Corp', 60, 19, 'AAR');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('DPL Inc', 30, 20, 'DPL');

INSERT INTO TRANSACTIONS_NQ ( NAME, QTY, TRANS_ID, SMB_TICKER )
VALUES ('HIA Inc', 20, 20, 'HIAI');
```

- **FINANCIAL_INSTRUMENTS Table**

```
CREATE TABLE FINANCIAL_INSTRUMENTS
(
  FINS_ID   NUMBER                                NOT NULL,
  TYPE      VARCHAR2(20 BYTE),
  DESCR     VARCHAR2(40 BYTE),
  TRANS_ID  NUMBER                                NOT NULL,
  PORT_ID   NUMBER                                NOT NULL
);

CREATE UNIQUE INDEX PK_FINANCIAL_INSTRUMENTS ON
FINANCIAL_INSTRUMENTS(FINS_ID);

ALTER TABLE FINANCIAL_INSTRUMENTS ADD (
  CONSTRAINT PK_FINANCIAL_INSTRUMENTS PRIMARY KEY (FINS_ID));

ALTER TABLE FINANCIAL_INSTRUMENTS ADD (
  CONSTRAINT FK_FI_TRANS FOREIGN KEY (TRANS_ID)
    REFERENCES TRANSACTIONS (TRANS_ID));

ALTER TABLE FINANCIAL_INSTRUMENTS ADD (
  CONSTRAINT FK_PT_FI FOREIGN KEY (PORT_ID)
    REFERENCES PORTFOLIOS (PORT_ID));

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (1, 'asset', 'IBM stock', 1, 100);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (2, 'asset', 'Enron stock', 2, 110);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (3, 'asset', 'ORCL stock', 3, 100);


INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (4, 'asset', 'VOD stock', 4, 100);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (5, 'asset ', '6% FNMA Corporate bond', 5, 120);
```

```
INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (6, 'asset', '10% International Bond Ford', 6, 120);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (7, 'asset', '6% News Co corporate bond', 8, 120);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (8, 'asset', '10% Intern Bond Boeng', 9, 120);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (9, 'asset', '0.5 div on Finove stock', 10, 100);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (10, 'portfolio', 'JAN IRA account', 11, 100);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (11, 'portfolio', 'JAN PRS account', 12, 110);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (12, 'portfolio', 'FEB bond account', 13, 120);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (13, 'portfolio', 'MAR bond account', 14, 130);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (14, 'asset', '8% UK Guild', 15, 130);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (15, 'asset', '7.25% CWE corporate bond 05/08', 17,
130);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (16, 'asset', 'purchase price $12 per share on
Apache ', 18, 110);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (19, 'asset', 'DPL Inc stock', 20, 110);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (20, 'asset', 'HIA Inc stock', 20, 110);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (17, 'asset', 'AIM stock', 19, 100);

INSERT INTO FINANCIAL_INSTRUMENTS ( FINS_ID, TYPE, DESCR, TRANS_ID,
PORT_ID ) VALUES (18, 'asset', 'AAR Corp', 19, 100);
```

- **ASSETS Table**

```
CREATE TABLE ASSETS
(
  ASSET_ID  NUMBER                                NOT NULL,
  DESCR     VARCHAR2(40 BYTE),
  TYPE      VARCHAR2(20 BYTE),
  FINS_ID   NUMBER                                NOT NULL
);

CREATE UNIQUE INDEX PK_ASSETS ON ASSETS (ASSET_ID);

CREATE PUBLIC SYNONYM ASSETS FOR ASSETS;

ALTER TABLE ASSETS ADD (CONSTRAINT PK_ASSETS PRIMARY KEY (ASSET_ID));

ALTER TABLE ASSETS ADD (
  CONSTRAINT FK_ASSETS_FINS FOREIGN KEY (FINS_ID)
    REFERENCES FINANCIAL_INSTRUMENTS (FINS_ID));

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
1, 'IBM stock', 'stock', 1);
```

```
INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
2, 'Enron stock', 'stock', 2);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
3, 'ORCL stock', 'stock', 3);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
4, 'VOD stock', 'stock', 4);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
5, '6% FNMA Corporate bond', 'bond', 5);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
6, '10% Intern Bond Ford', 'bond', 6);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
7, '6% News Co corporate bond', 'bond', 7);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
8, '10% International Bond Boeng', 'bond', 8);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
9, '0.5 div on Finove stock', 'stock', 9);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
10, '8% UK Guild', 'bond', 14);
INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
11, '7.25% CWE corporate bond 05/08', 'bond', 15);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
12, 'purchase price $12 per share on Apache ', 'stock', 16);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
13, 'AIM stock', 'stock', 17);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
14, 'AAR stock', 'stock', 18);

INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
15, 'DPL Inc  stock', 'stock', 19);


INSERT INTO ASSETS ( ASSET_ID, DESCR, TYPE, FINS_ID ) VALUES (
16, 'HIA Inc stock', 'stock', 20);
```

- **STOCKS Table**

```
CREATE TABLE STOCKS
(
  SMB_TICKER  VARCHAR2(8 BYTE)                  NOT NULL,
  NAME        VARCHAR2(20 BYTE),
  DESCR       VARCHAR2(40 BYTE),
  TYPE        VARCHAR2(20 BYTE),
  DIVIDEND    NUMBER,
  ASSET_ID    NUMBER                            NOT NULL
);

CREATE PUBLIC SYNONYM STOCKS FOR STOCKS;

ALTER TABLE STOCKS ADD (
  CONSTRAINT PK_STOCKS PRIMARY KEY (SMB_TICKER));

ALTER TABLE STOCKS ADD (
  CONSTRAINT FK_STOCK_ASSETS FOREIGN KEY (ASSET_ID)
    REFERENCES ASSETS (ASSET_ID));

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
```

```
ASSET_ID ) VALUES ('IBM', 'IBM', 'IBM common stock', 'common', 0.8,
1);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('ENRON', 'Enron', 'Enron preferred stock',
'preferred', NULL, 2);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('ORCL', 'Oracle', 'Oracle common stock', 'common',
0.7, 3);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('VOD', 'Vodafone ', 'Vodafone common stock',
'common', NULL, 4);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('FIN', 'Finove', 'Finova common stock', 'common',
0.5, 9);


INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('APACHE', 'Apache', 'purchase price $12 per share
on Apache ', 'preferred', NULL, 12);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('AIM', 'AIM Ent', 'AIM common stock', 'common',
NULL, 13);




INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('AAR', 'AAR Corp', 'AAR common stock', 'common',
0.8, 14);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('DPL', 'DPL Inc', 'D P L Inc preferred stock',
'preferred', NULL, 15);

INSERT INTO STOCKS ( SMB_TICKER, NAME, DESCR, TYPE, DIVIDEND,
ASSET_ID ) VALUES ('HIAI', 'HIA Inc', 'H I A Inc preferred stock',
'preferred', 0.6, 16);
```

- **STOCKS_TV Table**

```
CREATE TABLE STOCKS_TV
(
  ST_DATE     DATE,
  ST_SOURCE   VARCHAR2(20 BYTE)                 NOT NULL,
  CURRENCY    VARCHAR2(10 BYTE),
  VALUE       NUMBER,
  SMB_TICKER  VARCHAR2(8 BYTE)                  NOT NULL
);

CREATE INDEX IDX_ST_DATE ON STOCKS_TV (ST_DATE);

CREATE INDEX IDX_ST_TK ON STOCKS_TV (SMB_TICKER);

CREATE PUBLIC SYNONYM STOCKS_TV FOR STOCKS_TV;

ALTER TABLE STOCKS_TV ADD (
  CONSTRAINT CH_STOCKS_TV CHECK (ST_SOURCE IN
('actual','estimated')));

ALTER TABLE STOCKS_TV ADD (
  CONSTRAINT FK_STOKS_ST_TV FOREIGN KEY (SMB_TICKER)
    REFERENCES STOCKS (SMB_TICKER));
```

```
INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'IBM');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES ( TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.9 , 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.8 , 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 16, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.9, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 20.05, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 20.1, 'IBM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 11, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 11.9, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.8, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.05, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 10.75, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 11, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 13, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.9, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.75, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.05, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 12.1, 'AAR');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 71, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 71.9, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 69.8, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 62.05, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 70.75, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 71, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 69, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 72.9, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 72.75, 'AIM');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 69.05, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 70.1, 'AIM');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 24.9, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 24.8, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25.05, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 24.75, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25.8, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 24.9, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25.75, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 25.05, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 70.1, 'DPL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.47, 'HIAI');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.49, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.495, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.349, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.65, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.78, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.68, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.59, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.55, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 0.45, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 0.51, 'HIAI');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.9, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.8, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'FIN');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.75, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.9, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 11.75, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.05, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 18.1, 'FIN');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 19.9, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 19.8, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 20.05, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 19.75, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 21, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 22, 'ENRON');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 19.9, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 21.1, 'ENRON');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.9, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.8, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 20, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.9, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'ORCL');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 18.1, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 21, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.9, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 21, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 17.75, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 16, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 21.5, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 20, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 21, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 18.1, 'VOD');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/13/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18, 'ORCL');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
```

```
SMB_TICKER ) VALUES (TO_Date( '01/14/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.9, 'APACHE');


INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/18/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.8, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '01/17/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 18.05, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/06/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.75, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/03/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '02/12/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/21/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.9, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/22/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 11.75, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'actual', 'USD', 12.05, 'APACHE');

INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY, VALUE,
SMB_TICKER ) VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY
HH:MI:SS AM'), 'estimated', 'USD', 18.1, 'APACHE');
```

- **BONDS Table**

```
CREATE TABLE BONDS
(
  B_SYMBOL    VARCHAR2(8 BYTE)                  NOT NULL,
  B_DESC      VARCHAR2(20 BYTE),
  TYPE        VARCHAR2(20 BYTE),
  PRICE       NUMBER,
  IR_COUPON   NUMBER,
  PRINCIPAL   NUMBER,
  MATURITY    DATE,
  ASSET_ID    NUMBER                            NOT NULL
);

CREATE UNIQUE INDEX PK_BOND ON BONDS (B_SYMBOL);

CREATE PUBLIC SYNONYM BONDS FOR BONDS;


ALTER TABLE BONDS ADD (
  CONSTRAINT PK_BOND PRIMARY KEY (B_SYMBOL));

ALTER TABLE BONDS ADD (
  CONSTRAINT FK_BONDS_ASSETS FOREIGN KEY (ASSET_ID)
    REFERENCES ASSETS (ASSET_ID));
```

```
INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('FNMA', '6% FNMA Corporate
bo', 'corporate', 10000000, 6, 10000000,  TO_Date( '03/15/2005
12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'), 5);

INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('FORD', '10% Intern Bond
Ford', 'international', 2000000, 10, 2000000,  TO_Date( '09/15/2012
12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'), 6);

INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('NEWS', '6% News Co
corporate', 'corporate', 10000000, 6, 10000000,  TO_Date( '10/20/2013
12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'), 7);

INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('BOENG', '10% Intern Boeng',
'international', 20000000, 9.5, 20000000,  TO_Date( '09/14/2017
12:00:00 AM', 'MM/DD/YYYY HH:MI:SS AM'), 8);

INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('CWE', '7.25% CWE corporate ',
'corporate', 5000000, 7.25, 5000000,  TO_Date( '05/15/2008 12:00:00
AM', 'MM/DD/YYYY HH:MI:SS AM'), 11);

INSERT INTO BONDS ( B_SYMBOL, B_DESC, TYPE, PRICE, IR_COUPON,
PRINCIPAL, MATURITY,ASSET_ID ) VALUES ('UKGUIL', '8% UK Guild',
'guild', 1000000, 8, 1000000,  TO_Date( '04/15/2025 12:00:00 AM',
'MM/DD/YYYY HH:MI:SS AM'), 10);
```

- **PORTFOLIOS Tables**

```
CREATE TABLE PORTFOLIOS
(
  PORT_ID      NUMBER                           NOT NULL,
  NAME         VARCHAR2(20 BYTE),
  DESCR        VARCHAR2(40 BYTE),
  PRT_PORT_ID  NUMBER                           NOT NULL
);

CREATE UNIQUE INDEX PK_PORTFOLIOS ON PORTFOLIOS (PORT_ID);

CREATE UNIQUE INDEX UNQ_PT ON PORTFOLIOS (NAME);

CREATE PUBLIC SYNONYM PORTFOLIOS FOR PORTFOLIOS;


ALTER TABLE PORTFOLIOS ADD (
  CONSTRAINT PK_PORTFOLIOS PRIMARY KEY (PORT_ID));

ALTER TABLE PORTFOLIOS ADD (
  CONSTRAINT UNQ_PT UNIQUE (NAME)) ;

INSERT INTO PORTFOLIOS ( PORT_ID, NAME, DESCR, PRT_PORT_ID )
VALUES (100, 'JAN IRA', 'JAN IRA account', 100);

INSERT INTO PORTFOLIOS ( PORT_ID, NAME, DESCR, PRT_PORT_ID )
VALUES (110, 'JAN PRS', 'JAN PRS account', 110);

INSERT INTO PORTFOLIOS ( PORT_ID, NAME, DESCR, PRT_PORT_ID )
VALUES (120, 'FEB BOND', 'FEB bond account', 100);

INSERT INTO PORTFOLIOS ( PORT_ID, NAME, DESCR, PRT_PORT_ID )
VALUES (130, 'MAR BOND', 'MAR bond account', 110);
```

- **PORTFOLIO_OWNERS Table**

```
CREATE TABLE PORTFOLIO_OWNERS
(
  PO_ID    NUMBER                                NOT NULL,
  INV_ID   NUMBER                                NOT NULL,
  PORT_ID  NUMBER                                NOT NULL
);

CREATE PUBLIC SYNONYM PORTFOLIO_OWNERS FOR PORTFOLIO_OWNERS;

ALTER TABLE PORTFOLIO_OWNERS ADD (
  CONSTRAINT PK_PO PRIMARY KEY (PO_ID));

ALTER TABLE PORTFOLIO_OWNERS ADD (
  CONSTRAINT FK_PO_PORT FOREIGN KEY (PORT_ID)
    REFERENCES PORTFOLIOS (PORT_ID));

ALTER TABLE PORTFOLIO_OWNERS ADD (
  CONSTRAINT FK_PO_INV FOREIGN KEY (INV_ID)
    REFERENCES INVESTORS (INV_ID));

INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1000, 10, 120);

INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1010, 20, 120);

INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1020, 30, 120);

INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1030, 10, 100);

INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1040, 40, 130);
INSERT INTO PORTFOLIO_OWNERS ( PO_ID, INV_ID, PORT_ID )
VALUES (1050, 40, 110);
```

- **INVESTORS Table**

```
CREATE TABLE INVESTORS
(
  INV_ID     NUMBER                              NOT NULL,
  FULL_NAME  VARCHAR2(20 BYTE)                   NOT NULL,
  TYPE       VARCHAR2(20 BYTE),
  ADDRESS    VARCHAR2(40 BYTE),
  CONTACT    VARCHAR2(20 BYTE)
);

CREATE UNIQUE INDEX PK_PRIVATE_INVESTORS ON INVESTORS (INV_ID);

CREATE PUBLIC SYNONYM INVESTORS FOR INVESTORS;

ALTER TABLE INVESTORS ADD (
  CONSTRAINT PK_PRIVATE_INVESTORS PRIMARY KEY (INV_ID));

INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (10, 'Mark Campbell', 'private', 'Tower Hill, London',
'078976543');

INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (20, 'Daniele Panelli', 'private', 'Isleworth, London',
'dpanelli@bt.net');

INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (30, 'Irfan Alli', 'private', 'Bromley, London', '079426785');
```

```
INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (40, 'Mark''s Bank Plc', 'corporate', 'Moorgate, London',
'02076786543');

commit;
```

Database Integrity

The term integrity in the context of database refers to the correctness and consistency of the data stored in the database.

'Consistency' implies that the data held in the various tables of the database is consistent with the concept of the relational model. Consistency is expressed in terms of two characteristics:

1. Entity integrity is concerned with ensuring that each row of a table has a unique and non-null primary key value. (ex. table ***INVESTORS***)

```
INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (10, 'Raul Mecena', 'private', 'Barbican, London', '078');
*
ERROR at line 1:
ORA-00001: unique constraint (DEVELOPER.PK_PRIVATE_INVESTORS)
violated
INSERT INTO INVESTORS ( INV_ID, FULL_NAME, TYPE, ADDRESS, CONTACT )
VALUES (NULL, 'Raul Mecena', 'private', 'Barbican, London', '078');
*
ERROR at line 1:
ORA-01400: cannot insert NULL into("DEVELOPER"."INVESTORS"."INV_ID")
```

2. Referential integrity is concerned with the relationships between the tables of a database, i.e., that the data of one table does not contradict the data of another table.
   (ex. tables ***INVESTORS & PORTFOLIO_OWNERS***)

```
SQL> l
  1  select count(*) from portfolios pt, financial_instruments fi
  2* where pt.PORT_ID = fi.TYPE
SQL> /
where pt.PORT_ID = fi.TYPE
                   *
ERROR at line 2:
ORA-01722: invalid number


SQL> ed
Wrote file afiedt.buf

  1  select count(*) from portfolios pt, financial_instruments fi
  2* where pt.PORT_ID = fi.PORT_ID
SQL> /

  COUNT(*)
----------
        20
```

'Correctness' implies that data captured for entry into the computer does in fact correctly represent the 'real-world' data that it is supposed to.

(ex. table ***STOCKS_TV***, based on our assumption that the source could be actual or estimated)

```
ALTER TABLE STOCKS_TV ADD (
  CONSTRAINT CH_STOCKS_TV CHECK (ST_SOURCE IN
('actual','estimated')));


SQL> ed
Wrote file afiedt.buf
```

```
  1  INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY,
VALUE,SMB_TICKER )
  2  VALUES (TO_Date( '03/23/2005 12:00:00 AM', 'MM/DD/YYYY HH:MI:SS
AM'),
  3*    'derived', 'USD', 12.05, 'APACHE')
SQL> /
INSERT INTO STOCKS_TV ( ST_DATE, ST_SOURCE, CURRENCY,
VALUE,SMB_TICKER )
*
ERROR at line 1:
ORA-02290: check constraint (DEVELOPER.CH_STOCKS_TV) violated
```

Section 4 SQL and Relational Algebra expressions

(a) List all the portfolios held by Mark's Bank PLC

Assumption that we have one corporate investor institution called Mark's Bank Plc which have one main stock portfolio from preferred shares and one sub bond portfolio

```
SQL> select pt.port_id,
  2      pt.name PORTFOLIO,
  3      pt.descr,
  4      inv.FULL_NAME INVESTOR
  5  from portfolios pt,
  6      portfolio_owners po,
  7      investors inv
  8  where pt.PORT_ID = po.PORT_ID
  9  and po.INV_ID = inv.INV_ID
 10  and upper(inv.FULL_NAME) like 'MARK%BANK%'
 11  and upper(inv.TYPE) = 'CORPORATE'
 12  /

   PORT_ID PORTFOLIO            DESCR                                INVESTOR
---------- -------------------- ------------------------------------ ---------------
       130 MAR BOND             MAR bond account                     Mark's Bank Plc
       110 JAN PRS              JAN PRS account                      Mark's Bank Plc

2 rows selected.
```

```
Break down query on the assets by portfolios on Mark's Bank Plc(supplementary query)
SQL> select ass.DESCR,
  2        ass.TYPE,
  3        pt.NAME " Portfolio Name",
  4        pt.PRT_PORT_ID "Parent Portfolio",
  5        pt.PORT_ID "Original Portfolio",
  6        inv.FULL_NAME "Investor"
  7  from assets ass,
  8       financial_instruments fi,
  9       transactions tr,
 10       portfolios pt,
 11       portfolio_owners po,
 12       investors inv
 13  where ass.FINS_ID = fi.FINS_ID
 14  and fi.TRANS_ID = tr.TRANS_ID
 15  and tr.REC_DATE <= '23-MAR-05'
 16  and upper(tr.TYPE) != 'SALE'
 17  and fi.PORT_ID = pt.PORT_ID
 18  and pt.PRT_PORT_ID = po.PORT_ID
 19  and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 20                        where pt1.PORT_ID = pt.PRT_PORT_ID
 21                        and upper(pt1.NAME) like 'JAN PRS')
 22  and po.INV_ID = inv.INV_ID
 23  and upper(inv.FULL_NAME) like 'MARK%BANK%'
 24  and upper(inv.TYPE) = 'CORPORATE'
 25  order by pt.NAME desc;

DESCR                                TYPE  Portfolio Name  Parent Portfolio Original Portfolio Investor
------------------------------------ ----  -------------  ---------------- ------------------ -------------
8% UK Guild                          bond  MAR BOND       110              130                Mark's Bank Plc
7.25% CWE corporate bond 05/08       bond  MAR BOND       110              130                Mark's Bank Plc
Enron stock                          stock JAN PRS        110              110                Mark's Bank Plc
purchase price $12 per share on Apache stock JAN PRS      110              110                Mark's Bank Plc
DPL Inc  stock                       stock JAN PRS        110              110                Mark's Bank Plc
HIA Inc stock                        stock JAN PRS        110              110                Mark's Bank Plc

6 rows selected.
```

PROJECT$_{\text{port\_id,name,descr}}$ (PORTFOLIOS)**JOIN**$_{\text{port\_id=port\_id}}$ (
PROJECT$_{\text{port\_id}}$ (PORTFOLIO_OWNERS) **JOIN**$_{\text{inv\_id=inv\_id}}$ (
PROJECT$_{\text{full\_name,inv\_id}}$ (**SELECT**$_{\text{full\_name like 'MARK\%BANK\%' ^ type ='CORPORATE'}}$ INVESTORS))))

$\Pi_{\text{port\_id,name,descr}}$ (PORTFOLIOS)$\bowtie_{\text{prt\_port\_id=port\_id}}$ (
$\Pi_{\text{port\_id}}$ (PORTFOLIO_OWNERS)$\bowtie_{\text{inv\_id=inv\_id}}$ (
$\Pi_{\text{full\_name,inv\_id}}$ ($\sigma_{\text{full\_name like 'MARK\%BANK' ^ type ='CORPORATE'}}$ (INVESTORS))))

```
-- (a) List all the portfolios held by Mark's Bank PLC
select pt.port_id,
       pt.name PORTFOLIO,
       pt.descr,
       inv.FULL_NAME INVESTOR
from portfolios pt,
     portfolio_owners po,
     investors inv
where pt.PORT_ID = po.PORT_ID
and po.INV_ID = inv.INV_ID
and upper(inv.FULL_NAME) like 'MARK%BANK%'
and upper(inv.TYPE) = 'CORPORATE'
```

(b) List the assets that directly belong to Mark's No.1 portfolio on the 23-MAR-2005
we assume that Mark's No.1 portfolio is cold 'JAN IRA''

```
SQL> select ass.ASSET_ID,
  2         ass.DESCR,
  3         ass.TYPE,
  4         pt.NAME "Portfolio Name",
  5         pt.PRT_PORT_ID "Parent Portfolio",
  6         pt.PORT_ID "Original Portfolio",
  7         inv.FULL_NAME "Investor Name"
  8  from assets ass,
  9       financial_instruments fi,
 10       transactions tr,
 11       portfolios pt,
 12       portfolio_owners po,
 13       investors inv
 14  where ass.FINS_ID = fi.FINS_ID
 15  and fi.TRANS_ID = tr.TRANS_ID
 16  and tr.REC_DATE <= '23-MAR-05'
 17  and upper(tr.TYPE) != 'SALE'
 18  and fi.PORT_ID = pt.PORT_ID
 19  and pt.PORT_ID = pt.PRT_PORT_ID
 20  and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 21                        where pt1.PORT_ID = pt.PRT_PORT_ID
 22                        and upper(pt1.NAME) = 'JAN IRA')
 23  and pt.PRT_PORT_ID = po.PORT_ID
 24  and po.INV_ID = inv.INV_ID
 25  and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
 26  and upper(inv.TYPE) = 'PRIVATE';

  ASSET_ID DESCR                                    TYPE                Portfolio Name       Parent Portfolio Original Portfolio Investor Name
---------- ---------------------------------------- ------------------- -------------------- ---------------- ----------------- ------------
         1 IBM stock                                stock               JAN IRA                           100               100 Mark Campbell
         3 ORCL stock                               stock               JAN IRA                           100               100 Mark Campbell
         4 VOD stock                                stock               JAN IRA                           100               100 Mark Campbell
         9 0.5 div on Finove stock                  stock               JAN IRA                           100               100 Mark Campbell
        13 AIM stock                                stock               JAN IRA                           100               100 Mark Campbell
        14 AAR stock                                stock               JAN IRA                           100               100 Mark Campbell

6 rows selected.
```

PROJECT$_{asset\_id,descr,type}$ (ASSETS) **JOIN**$_{fins\_id=fins\_id}$ (
PROJECT$_{fins\_id}$ (FINANCIAL_INSTRUMENTS) **JOIN**$_{trans\_id=trans\_id}$ (
PROJECT$_{trans\_id}$ (**SELECT**$_{rec\_date = '23\text{-}MAR\text{-}05' \wedge type != 'SALE'}$ TRANSACTIONS) **JOIN**$_{port\_id=port\_id}$ (
PROJECT$_{port\_id,prt\_port\_id,name}$ (**SELECT**$_{prt\_port\_id=port\_id \wedge prt\_port\_id}$ = (PROJECTport_id ([SELECTname = 'JAN IRA' (RENAME pt1 (PORTFOLIOS)] JOINport_id=prt_port_id [RENAME pt (PORTFOLIOS)])
PORTFOLIOS)**JOIN**$_{prt\_port\_id=port\_id}$ (
PROJECT$_{port\_id}$ (PORTFOLIO_OWNERS) **JOIN**$_{inv\_id=inv\_id}$ (
PROJECT$_{full\_name,inv\_id}$ (**SELECT**$_{full\_name = 'MARK\ CAMPBELL' \wedge type ='PRIVATE'}$ INVESTORS))))))

$$\Pi_{asset\_id,descr,type}(ASSETS) \bowtie_{fins\_id=fins\_id} ($$
$$\Pi_{fins\_id}(FINANCIAL\_INSTRUMENTS) \bowtie_{trans\_id=trans\_id} ($$
$$\Pi_{trans\_id}(\sigma_{rec\_date = '23\text{-}MAR\text{-}05' \wedge type != 'SALE'}(TRANSACTIONS)) \bowtie_{port\_id=port\_id} ($$
$$\Pi_{port\_id,prt\_port\_id,name}(\sigma_{prt\_port\_id=port\_id \wedge prt\_port\_id = (\Pi port\_id([\sigma name\ like\ 'JAN\ IRA\%'(\rho\ pt1\ (PORTFOLIOS)] \bowtie_{port\_id=prt\_port\_id} [\rho\ pt\ (PORTFOLIOS)]))}(PORTFOLIOS)) \bowtie_{prt\_port\_id=port\_id} ($$
$$\Pi_{port\_id}(PORTFOLIO\_OWNERS) \bowtie_{inv\_id=inv\_id} ($$
$$\Pi_{full\_name,inv\_id}(\sigma_{full\_name = 'MARK\ CAMPBELL' \wedge type = 'PRIVATE'}(INVESTORS))))))$$

```
-(b) List the assets that directly belong to Mark's No.1 portfolio on the 23-MAR-2005
-- assumes that Mark's No.1 portfolio is cold 'JAN IRA''
select ass.ASSET_ID,
       ass.DESCR,
       ass.TYPE,
       pt.NAME "Portfolio Name",
       pt.PRT_PORT_ID "Parent Portfolio",
       pt.PORT_ID "Original Portfolio",
       inv.FULL_NAME "Investor Name"
from assets ass,
     financial_instruments fi,
     transactions tr,
     portfolios pt,
     portfolio_owners po,
     investors inv
where ass.FINS_ID = fi.FINS_ID
and fi.TRANS_ID = tr.TRANS_ID
and tr.REC_DATE <= '23-MAR-05'
and upper(tr.TYPE) != 'SALE'
and fi.PORT_ID = pt.PORT_ID
and pt.PORT_ID = pt.PRT_PORT_ID
and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
                      where pt1.PORT_ID = pt.PRT_PORT_ID
                      and upper(pt1.NAME) = 'JAN IRA')
and pt.PRT_PORT_ID = po.PORT_ID
and po.INV_ID = inv.INV_ID
and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
and upper(inv.TYPE) = 'PRIVATE'
```

(c) Calculate the total transaction fee incurred directly on assts(not sub-portfolios) of Mark's No.1 portfolio on 23-MAR-2005

WE assume that Marks No.1 is JAN IRA stock portfolio and the transaction fee is usually registered for a single asset which includes the transaction cost plus commissions and in our case we have two transaction ids 19 and 20, which have registered two assets for each transaction, so to find the transaction cost for each asset we calculate the average fee ignoring the % weight of the assets within the transaction.

```
SQL> select sum(nvl(tr.FEE,0)/(select count(tda.TRANS_ID) from transactions_del_add tda
  2                             where tda.TRANS_ID = tr.TRANS_ID
  3                             and upper(tda.TYPE) = 'DEPOSIT'))"TOTAL PORTFOLIO FEE",
  4         pt.NAME "PORTFOLIO NAME",
  5         inv.FULL_NAME "INVESTOR NAME"
  6  from transactions tr,
  7       financial_instruments fi,
  8       portfolios pt,
  9       portfolio_owners po,
 10       investors inv
 11  where upper(tr.TYPE) in ('SALE','PURCHASE')
 12  and tr.REC_DATE between '01-JAN-05' and '01-MAR-05'
 13  and tr.TRANS_ID = fi.TRANS_ID
 14  and fi.PORT_ID = pt.PORT_ID
 15  and pt.PORT_ID = pt.PRT_PORT_ID
 16  and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 17                        where pt1.PORT_ID = pt.PRT_PORT_ID
 18                        and upper(pt1.NAME) = 'JAN IRA')
 19  and pt.PRT_PORT_ID = po.PORT_ID
 20  and po.INV_ID = inv.INV_ID
 21  and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
 22  and upper(inv.TYPE) = 'PRIVATE'
 23  group by pt.NAME ,
 24        inv.FULL_NAME;

TOTAL PORTFOLIO FEE PORTFOLIO NAME       INVESTOR NAME
------------------- -------------------- --------------------
                405 JAN IRA              Mark Campbell
```

```
-- break down of the transaction fee by the stocks fee
SQL> select st.SMB_TICKER,
  2         tr.TYPE,
  3         tr.TRANS_ID,
  4         tr.FEE "TRANASACTION FEE",
  5         tr.FEE/(select count(tda.TRANS_ID) from transactions_del_add tda
  6                 where tda.TRANS_ID = tr.TRANS_ID
  7                 and upper(tda.TYPE) = 'DEPOSIT') "STOCK FEE",
  8         tr.TRANS_DATE,
  9         tr.REC_DATE,
 10         pt.NAME "PORTFOLIO NAME",
 11         inv.FULL_NAME "INVESTOR NAME"
 12  from transactions tr,
 13       financial_instruments fi,
 14       assets ass,
 15       stocks st,
 16       portfolios pt,
 17       portfolio_owners po,
 18       investors inv
 19  where upper(tr.TYPE) in ('SALE','PURCHASE')
 20  and tr.REC_DATE between '01-JAN-05' and '01-MAR-05'
 21  and tr.TRANS_ID = fi.TRANS_ID
 22  and fi.FINS_ID = ass.FINS_ID
 23  and ass.ASSET_ID = st.ASSET_ID
 24  and fi.PORT_ID = pt.PORT_ID
 25  and pt.PRT_PORT_ID = po.PORT_ID
 26  and pt.PORT_ID = pt.PRT_PORT_ID
 27  and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 28                        where pt1.PORT_ID = pt.PRT_PORT_ID
 29                       and upper(pt1.NAME) like 'JAN IRA%')
 30  and po.INV_ID = inv.INV_ID
 31  and upper(inv.FULL_NAME) like 'MARK%'
 32  and upper(inv.TYPE) = 'PRIVATE'
 33  order by 4;

SMB_TICK TYPE                 TRANS_ID TRANASACTION FEE  STOCK FEE TRANS_DAT REC_DATE  PORTFOLIO NAME   INVESTOR NAME
-------- -------------------- ---------- ---------------- ---------- --------- --------- --------------   ---------------
VOD      purchase                      4               80         80 14-JAN-05 15-JAN-05 JAN IRA          Mark Campbell
IBM      purchase                      1               95         95 13-JAN-05 15-JAN-05 JAN IRA          Mark Campbell
ORCL     purchase                      3              100        100 14-JAN-05 15-JAN-05 JAN IRA          Mark Campbell
AIM      purchase                     19              130         65 12-JAN-05 14-JAN-05 JAN IRA          Mark Campbell
AAR      purchase                     19              130         65 12-JAN-05 14-JAN-05 JAN IRA          Mark Campbell
```

name, full_name**F**$_{sum(fee)}$ (**PROJECT**$_{fee,}$ **F**count(trans_id)[(**PROJECT**trans_id(**SELECT** type='DEPOSIT'(TRANSACTINS_DEL_ADD **JOIN** trans_id=trans_id))](**SELECT**$_{type\ in\ ('SALE','PURCHASE')\ \wedge\ rec\_date\ between\ '01\text{-}JAN\text{-}05'\ and\ '01\text{-}MAR\text{-}05'}$ TRANSACTIONS **JOIN**$_{trans\_id=trans\_id}$ (
PROJECT$_{trans\_id}$ (FINANCIAL_INSTRUMENTS **JOIN**$_{port\_id=port\_id}$ (

PROJECT $_{name,port\_id,prt\_port\_id}$ (**SELECT**$_{prt\_port\_id=port\_id\ \wedge\ prt\_port\_id\ =}$ (PROJECTport_id ([SELECTname like 'JAN IRA%' (RENAME pt1 (PORTFOLIOS)] JOINport_id=prt_port_id [RENAME pt (PORTFOLIOS)])
PORTFOLIOS **JOIN**$_{prt\_port\_id=\ port\_id}$ (

PROJECT$_{\text{port\_id}}$ (PORTFOLIO_OWNERS **JOIN** $_{\text{inv\_id=inv\_id}}$ (

PROJECT$_{\text{full\_name,inv\_id}}$ (**SELECT**$_{\text{full\_name = 'MARK CAMPBELL' ^ type ='PRIVATE'}}$ INVESTORS)))))

$_{\text{name, full\_name}}\chi_{\text{sum(fee)}}$ ($\Pi_{\text{fee,}}$ $\chi_{\text{count(trans\_id)}}$[($\Pi_{\text{trans\_id}}$(σ $_{\text{type='DEPOSIT'}}$(TRANSACTINS_DEL_ADD$\bowtie$ $_{\text{trans\_id=trans\_id}}$))] ($\sigma_{\text{type in ('SALE',PURCHASE') ^ rec\_date between '01-JAN-05' and '01-MAR-05'}}$ (TRANSACTIONS) $\bowtie$ $_{\text{trans\_id=trans\_id}}$ (

$\Pi_{\text{trans\_id}}$ (FINANCIAL_INSTRUMENTS)$\bowtie$ $_{\text{port\_id=port\_id}}$ (

$\Pi_{\text{name,port\_id}}$ ($\sigma_{\text{prt_port_id=port_id ^ prt_port_id = (}}$$\Pi_{\text{port_id}}$ ([$\sigma_{\text{name = 'JAN IRA'}}$ (ρ pt1 (PORTFOLIOS))]$\bowtie$ $_{\text{port\_id=prt\_port\_id}}$ [ρ pt (PORTFOLIOS)]) (PORTFOLIOS) $\bowtie$ $_{\text{prt\_port\_id=port\_id}}$ (

$\Pi_{\text{port\_id}}$ (PORTFOLIO_OWNERS)$\bowtie$ $_{\text{inv\_id=inv\_id}}$ (

$\Pi_{\text{full\_name,inv\_id}}$ ($\sigma_{\text{full\_name = 'MARK CAMPBELL' ^ type ='PRIVATE'}}$ (INVESTORS)))))

```
select sum(nvl(tr.FEE,0)/(select count(tda.TRANS_ID) from transactions_del_add tda
                          where tda.TRANS_ID = tr.TRANS_ID
                          and upper(tda.TYPE) = 'DEPOSIT'))"TOTAL PORTFOLIO FEE",
       pt.NAME "PORTFOLIO NAME",
       inv.FULL_NAME "INVESTOR NAME"
from transactions tr,
     financial_instruments fi,
     portfolios pt,
     portfolio_owners po,
     investors inv
where upper(tr.TYPE) in ('SALE','PURCHASE')
and tr.REC_DATE between '01-JAN-05' and '01-MAR-05'
and tr.TRANS_ID = fi.TRANS_ID
and fi.PORT_ID = pt.PORT_ID
and pt.PORT_ID = pt.PRT_PORT_ID
and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
                      where pt1.PORT_ID = pt.PRT_PORT_ID
                      and upper(pt1.NAME) = 'JAN IRA')
and pt.PRT_PORT_ID = po.PORT_ID
and po.INV_ID = inv.INV_ID
and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
and upper(inv.TYPE) = 'PRIVATE'
group by pt.NAME ,
         inv.FULL_NAME
```

(d) List the assets that directly, or indirectly, belong to Mark's No.1 portfolio on 23 March 2005

We assume that Narks No.1 is 'JAN IRA' stock portfolio and sub-portfolio is 'FEB BOND' bond portfolio

```
SQL> select ass.ASSET_ID,
  2       ass.DESCR,
  3       ass.TYPE,
  4       pt.NAME " Portfolio Name",
  5       pt.PRT_PORT_ID "Parent Portfolio",
  6       pt.PORT_ID "Original Portfolio",
  7       inv.FULL_NAME "Investor"
  8  from assets ass,
  9       financial_instruments fi,
 10       transactions tr,
```

```
 11       portfolios pt,
 12       portfolio_owners po,
 13       investors inv
 14  where ass.FINS_ID = fi.FINS_ID
 15  and fi.TRANS_ID = tr.TRANS_ID
 16  and tr.REC_DATE <= '23-MAR-05'
 17  and upper(tr.TYPE) != 'SALE'
 18  and fi.PORT_ID = pt.PORT_ID
 19  and pt.PRT_PORT_ID = po.PORT_ID
 20  and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 21                        where pt1.PORT_ID = pt.PRT_PORT_ID
 22                        and upper(pt1.NAME) = 'JAN IRA')
 23  and po.INV_ID = inv.INV_ID
 24  and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
 25  and upper(inv.TYPE) = 'PRIVATE'
 26  order by pt.NAME desc;
```

ASSET_ID	DESCR	TYPE	Portfolio Name	Parent Portfolio	Original Portfolio	Investor Name
1	IBM stock	stock	JAN IRA	100	100	Mark Campbell
3	ORCL stock	stock	JAN IRA	100	100	Mark Campbell
9	0.5 div on Finove stock	stock	JAN IRA	100	100	Mark Campbell
13	AIM stock	stock	JAN IRA	100	100	Mark Campbell
4	VOD stock	stock	JAN IRA	100	100	Mark Campbell
14	AAR stock	stock	JAN IRA	100	100	Mark Campbell
5	6% FNMA Corporate bond	bond	FEB BOND	100	120	Mark Campbell
6	10% Intern Bond Ford	bond	FEB BOND	100	120	Mark Campbell
7	6% News Co corporate bond	bond	FEB BOND	100	120	Mark Campbell
8	10% International Bond Boeng	bond	FEB BOND	100	120	Mark Campbell

10 rows selected.

(e) Calculate the value of 'Mark's No.1' is "JAN IRA" portfolio on the 23 March 2005

```
SQL> SELECT (
  2   (select sum((nvl(stv.VALUE,0)*nvl(tnq.QTY,0))+(nvl(st.DIVIDEND,0)*nvl(tnq.QTY,0))) -- MAIN PORTFOLIO TOTAL STOCK VALUE
  3    from assets ass,
  4         stocks st,
  5         stocks_tv stv,
  6         financial_instruments fi,
  7         transactions tr,
  8         transactions_del_add tda,
  9         transactions_nq tnq,
 10         portfolios pt,
 11         portfolio_owners po,
 12         investors inv
 13   where ass.FINS_ID = fi.FINS_ID
 14   and ass.ASSET_ID = st.ASSET_ID
 15   and rtrim(ltrim(upper(st.SMB_TICKER))) = rtrim(ltrim(upper(tnq.SMB_TICKER)))
 16   and rtrim(ltrim(upper(st.SMB_TICKER))) = rtrim(ltrim(upper(stv.SMB_TICKER)))
 17   and stv.ST_DATE = '23-MAR-05'
 18   and upper(stv.ST_SOURCE) = 'ACTUAL'
 19   and fi.TRANS_ID = tr.TRANS_ID
```

```
 20   and tr.REC_DATE <= '23-MAR-05'
 21   and upper(tr.TYPE) != 'SALE'
 22   and tr.TRANS_ID = tda.TRANS_ID
 23   and upper(tda.TYPE) != 'WITHDRAWAL'
 24   and tr.TRANS_ID = tnq.TRANS_ID
 25   and fi.PORT_ID = pt.PORT_ID
 26   and pt.PRT_PORT_ID = pt.PORT_ID
 27   and pt.PRT_PORT_ID = po.PORT_ID
 28   and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 29                         where pt1.PORT_ID = pt.PRT_PORT_ID
 30                         and upper(pt1.NAME) = 'JAN IRA')
 31   and po.INV_ID = inv.INV_ID
 32   and upper(inv.FULL_NAME) = 'MARK CAMPBELL'
 33   and upper(inv.TYPE) = 'PRIVATE')
 34  +
 35   (select  sum(nvl((b.IR_COUPON*b.PRINCIPAL)/100,0) + nvl(decode(to_char(b.MATURITY,'MON-YYYY'),'MAR-2005',b.PRINCIPAL,0),0))-- SUB PORTFOLIO
TOTAL BOND VALUE
 36   from assets ass,
 37       bonds b,
 38       financial_instruments fi,
 39       transactions tr,
 40       transactions_del_add tda,
 41       portfolios pt,
 42       portfolio_owners po,
 43       investors inv
 44   where ass.ASSET_ID = b.ASSET_ID
 45   and ass.FINS_ID = fi.FINS_ID
 46   and fi.TRANS_ID = tr.TRANS_ID
 47   and tr.REC_DATE <= '23-MAR-05'
 48   and upper(tr.TYPE) in ('INTEREST','PRINCIPAL')
 49   and tr.TRANS_ID = tda.TRANS_ID
 50   and upper(tda.TYPE) != 'WITHDRAWAL'
 51   and fi.PORT_ID = pt.PORT_ID
 52   and pt.PORT_ID != pt.PRT_PORT_ID
 53   and pt.PORT_ID = po.PORT_ID
 54   and po.INV_ID = inv.INV_ID
 55   and upper(inv.FULL_NAME) like 'MARK%'
 56   and upper(inv.TYPE) = 'PRIVATE') ) "GRAND TOTAL",
 57   (select pt.NAME from portfolios pt
 58    where upper(pt.NAME) = 'JAN IRA') "PORTFOLIO NAME",
 59   (select inv.FULL_NAME from investors inv
 60    where upper(inv.FULL_NAME) = 'MARK CAMPBELL' and upper(inv.TYPE) = 'PRIVATE') "INVESTOR NAME",
 61    '23-MAR-2005' "PORTFOLIO DATE"
 62   FROM DUAL;

GRAND TOTAL PORTFOLIO NAME       INVESTOR NAME        PORTFOLIO DATE
----------- -------------------- -------------------- --------------
   13324166 JAN IRA              Mark Campbell        23-MAR-2005
```

```
-- Break-down the value of portfolio on the assets value (stocks and bonds)
-- useful for reconciliation
SQL> ed
Wrote file afiedt.buf

  1  select sum((nvl(stv.VALUE,0)*nvl(tnq.QTY,0))+(nvl(st.DIVIDEND,0)*nvl(tnq.QTY,0))) "Portfolio Va
  2         pt.NAME "Porfolio Name",
  3         inv.FULL_NAME "Investor Name",
  4         decode(tr.TYPE,'sale',tr.REC_DATE,'23-MAR-05') "Portfolio Date",
  5         st.SMB_TICKER "Ticker"
  6   from assets ass,
  7        stocks st,
  8        stocks_tv stv,
  9        financial_instruments fi,
 10        transactions tr,
 11        transactions_del_add tda,
 12        transactions_nq tnq,
 13        portfolios pt,
 14        portfolio_owners po,
 15        investors inv
 16   where ass.FINS_ID = fi.FINS_ID
 17   and ass.ASSET_ID = st.ASSET_ID
 18   and rtrim(ltrim(upper(st.SMB_TICKER))) = rtrim(ltrim(upper(tnq.SMB_TICKER)))
 19   and rtrim(ltrim(upper(st.SMB_TICKER))) = rtrim(ltrim(upper(stv.SMB_TICKER)))
 20   and stv.ST_DATE = '23-MAR-05'
 21   and upper(stv.ST_SOURCE) = 'ACTUAL'
 22   and fi.TRANS_ID = tr.TRANS_ID
 23   and tr.REC_DATE <= '23-MAR-05'
 24   and upper(tr.TYPE) != 'SALE'
 25   and tr.TRANS_ID = tda.TRANS_ID
 26   and upper(tda.TYPE) != 'WITHDRAWAL'
 27   and tr.TRANS_ID = tnq.TRANS_ID
 28   and fi.PORT_ID = pt.PORT_ID
 29   and pt.PRT_PORT_ID = pt.PORT_ID
 30   and pt.PRT_PORT_ID = po.PORT_ID
 31   and pt.PRT_PORT_ID = (select pt1.PORT_ID from portfolios pt1
 32                         where pt1.PORT_ID = pt.PRT_PORT_ID
 33                         and upper(pt1.NAME) like 'JAN IRA%')
 34   and po.INV_ID = inv.INV_ID
 35   and upper(inv.FULL_NAME) like 'MARK%'
 36   and upper(inv.TYPE) = 'PRIVATE'
 37   group by pt.NAME,inv.FULL_NAME,tr.TYPE, tr.REC_DATE, st.SMB_TICKER
 38  UNION
 39   select  sum(nvl((b.IR_COUPON*b.PRINCIPAL)/100,0) + nvl(decode(to_char(b.MATURITY,'MON-YYYY'),'MAR-2005',b.PRINCIPAL,0),0))  "Portfolio
Value",
 40   pt.NAME "Portfolio Name",
 41   inv.FULL_NAME " Investor Name",
 42   decode(tr.TYPE,'sale',tr.REC_DATE,'23-MAR-05') "Portfolio Date",
 43   b.B_SYMBOL "Ticker"
 44   from assets ass,
 45       bonds b,
```

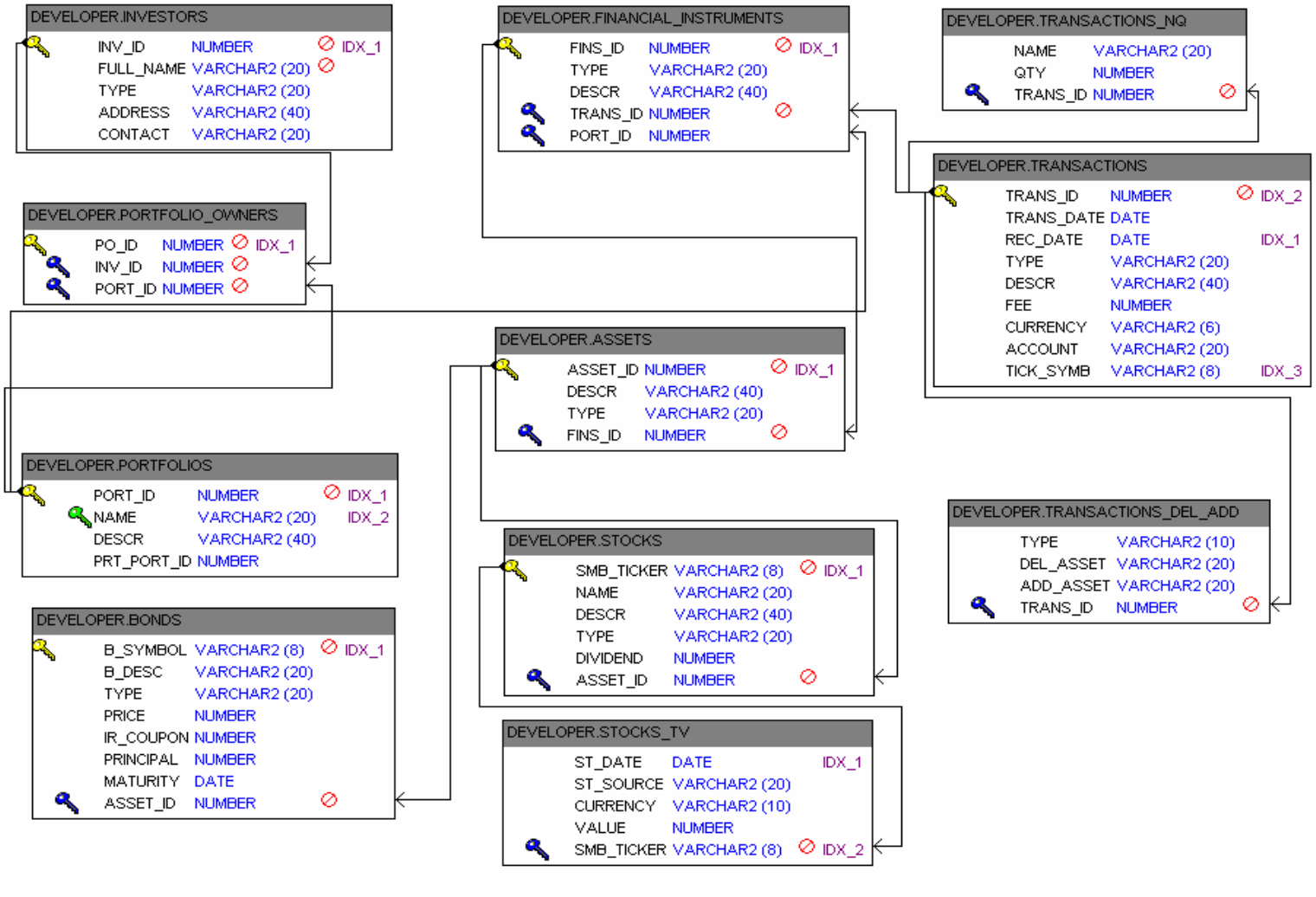
```
 46       financial_instruments fi,
 47       transactions tr,
 48       transactions_del_add tda,
 49       portfolios pt,
 50       portfolio_owners po,
 51       investors inv
 52   where ass.ASSET_ID = b.ASSET_ID
 53   and ass.FINS_ID = fi.FINS_ID
 54   and fi.TRANS_ID = tr.TRANS_ID
 55   and tr.REC_DATE <= '23-MAR-05'
 56   and upper(tr.TYPE) in ('INTEREST','PRINCIPAL')
 57   and tr.TRANS_ID = tda.TRANS_ID
 58   and upper(tda.TYPE) != 'WITHDRAWAL'
 59   and fi.PORT_ID = pt.PORT_ID
 60   and pt.PORT_ID != pt.PRT_PORT_ID
 61   and pt.PORT_ID = po.PORT_ID
 62   and po.INV_ID = inv.INV_ID
 63   and upper(inv.FULL_NAME) like 'MARK%'
 64   and upper(inv.TYPE) = 'PRIVATE'
 65*  group by pt.NAME,inv.FULL_NAME, tr.TYPE, tr.REC_DATE, b.B_SYMBOL
SQL> /

Portfolio Value Porfolio Name        Investor Name        Portfolio Ticker
--------------- -------------------- -------------------- --------- --------
           1050 JAN IRA              Mark Campbell        23-MAR-05 VOD
           1542 JAN IRA              Mark Campbell        23-MAR-05 AAR
           5524 JAN IRA              Mark Campbell        23-MAR-05 AIM
           5625 JAN IRA              Mark Campbell        23-MAR-05 ORCL
          10425 JAN IRA              Mark Campbell        23-MAR-05 IBM
         200000 FEB BOND             Mark Campbell        23-MAR-05 FORD
         600000 FEB BOND             Mark Campbell        23-MAR-05 NEWS
        1900000 FEB BOND             Mark Campbell        23-MAR-05 BOENG
       10600000 FEB BOND             Mark Campbell        23-MAR-05 FNMA

9 rows selected.
```

This concludes the part 4, I would also like to point out that some extra indexes have been created on columns which are not primary, foreign or unique constraints as to gain better query performance:
ex TRANSACTIONS table (rec_date and tick_symb)

This ERD model shows the final physical database creation form the Portfolio Management System.


DEVELOPER.INVESTORS
INV_ID NUMBER IDX_1
FULL_NAME VARCHAR2 (20)
TYPE VARCHAR2 (20)
ADDRESS VARCHAR2 (40)
CONTACT VARCHAR2 (20)
DEVELOPER.FINANCIAL_INSTRUMENTS
FINS_ID NUMBER IDX_1
TYPE VARCHAR2 (20)
DESCR VARCHAR2 (40)
TRANS_ID NUMBER
PORT_ID NUMBER
DEVELOPER.TRANSACTIONS_NQ
NAME VARCHAR2 (20)
QTY NUMBER
TRANS_ID NUMBER
DEVELOPER.TRANSACTIONS
TRANS_ID NUMBER IDX_2
TRANS_DATE DATE
REC_DATE DATE IDX_1
TYPE VARCHAR2 (20)
DESCR VARCHAR2 (40)
FEE NUMBER
CURRENCY VARCHAR2 (6)
ACCOUNT VARCHAR2 (20)
TICK_SYMB VARCHAR2 (8) IDX_3
DEVELOPER.PORTFOLIO_OWNERS
PO_ID NUMBER IDX_1
INV_ID NUMBER
PORT_ID NUMBER
DEVELOPER.ASSETS
ASSET_ID NUMBER IDX_1
DESCR VARCHAR2 (40)
TYPE VARCHAR2 (20)
FINS_ID NUMBER
DEVELOPER.PORTFOLIOS
PORT_ID NUMBER IDX_1
NAME VARCHAR2 (20) IDX_2
DESCR VARCHAR2 (40)
PRT_PORT_ID NUMBER
DEVELOPER.TRANSACTIONS_DEL_ADD
TYPE VARCHAR2 (10)
DEL_ASSET VARCHAR2 (20)
ADD_ASSET VARCHAR2 (20)
TRANS_ID NUMBER
DEVELOPER.STOCKS
SMB_TICKER VARCHAR2 (8) IDX_1
NAME VARCHAR2 (20)
DESCR VARCHAR2 (40)
TYPE VARCHAR2 (20)
DIVIDEND NUMBER
ASSET_ID NUMBER
DEVELOPER.BONDS
B_SYMBOL VARCHAR2 (8) IDX_1
B_DESC VARCHAR2 (20)
TYPE VARCHAR2 (20)
PRICE NUMBER
IR_COUPON NUMBER
PRINCIPAL NUMBER
MATURITY DATE
ASSET_ID NUMBER
DEVELOPER.STOCKS_TV
ST_DATE DATE IDX_1
ST_SOURCE VARCHAR2 (20)
CURRENCY VARCHAR2 (10)
VALUE NUMBER
SMB_TICKER VARCHAR2 (8) IDX_2