These triggers have been designed with practicality in mind. They mainly affect the databases employee and bookstore relations, and are designed to handle the addition or removal of members of staff. The create_employee trigger establishes a new employee within the database. The modify_employee trigger maintains the integrity constraints of the database when an employee's hours change. The modify_employee2 trigger keeps the combined salaries of the employees working at each store consistent. The delete_employee trigger removed an employee tuple from the database. The check_wage_1 trigger updates the employees wage based on a change in hours or hourly rate.

Source code trig.sql:

```
* adding and removing employees.
*/

--Employee wage update
/**
* This trigger updates the wage of an employee, whether they already in the
* database or they have been added as a new employee. The trigger is activated
* when an employee wage is updated.
*/

CREATE OR REPLACE TRIGGER check_wage_1
BEFORE INSERT OR UPDATE ON employee_wage
FOR EACH ROW
BEGIN
:NEW.wage := :NEW.weekly_hours * :NEW.hourly_rate;
END;
/

--New employee
/**
* When a new employee is hired they need to be initialised into the system and
* their derived attributes must be calculated and inserted. The trigger is
* activated by inserting a new tuple into the employee relation.
*/
CREATE OR REPLACE TRIGGER create_employee
AFTER INSERT ON employee
FOR EACH ROW
BEGIN
UPDATE bookstore
SET TOTAL_SALARY = TOTAL_SALARY + :NEW.WEEKLY_HOURS * :NEW.HOURLY_RATE
WHERE storeID = :NEW.bookstoreID;
END;
/

--Modify employee hours
/**
* When an employees hours or pay rate is changed, this trigger updates the
* values of the derived attributes related to those values. This trigger is
* activated when an employee's weekly hours or hourly rate are modified.
*/
CREATE OR REPLACE TRIGGER modify  employee
AFTER UPDATE OF weekly_hours, hourly_rate ON employee
FOR EACH ROW
```

```
BEGIN
UPDATE bookstore
SET total_salary = total_salary + :NEW.WEEKLY_HOURS * :NEW.HOURLY_RATE - :OLD.weekly_hours *
:OLD.hourly_rate
WHERE storeID = :NEW.bookstoreID;
END;
/

--Modify employee bookstoreID
/**
* When an employee shifts from working in one store to another, the derived
* attributes related to this employee's previous and current workplace (store)
* must be updated. This trigger is activated when the bookstoreID of an
* employee is changed (i.e. they work for a different store).
*/
CREATE OR REPLACE TRIGGER modify_employee2
AFTER UPDATE OF bookstoreID ON employee
FOR EACH ROW
BEGIN
UPDATE bookstore
SET total_salary = total_salary + :NEW.WEEKLY_HOURS * :NEW.HOURLY_RATE
WHERE storeID = :NEW.bookstoreID;
UPDATE bookstore
SET total_salary = total_salary - :OLD.weekly_hours * :OLD.hourly_rate
WHERE storeID = :OLD.bookstoreID;
END;
/

--Delete employee
/**
* This trigger adjusts the derived attributes of a store that has just had one
* of it's employees removed. The trigger is activated by the removal of an
* employee.
*/
CREATE OR REPLACE TRIGGER delete_employee
AFTER DELETE ON employee
FOR EACH ROW
BEGIN
UPDATE bookstore
SET total_salary = total_salary - :OLD.weekly_hours * :OLD.hourly_rate
WHERE storeID = :OLD.bookstoreID;
END;
/

/* Queries which should trigger*/

/*
q09
create employee, triggers create_employee
*/
INSERT INTO employee VALUES
('Callum','L','Grimmer','222-222-222', '0223280608', '38','1500','0003');
/*
q09
create employee, triggers create_employee
*/
INSERT INTO employee VALUES
('William','H','Shakespeare','221-221-221', '0223380608', '38','1500','0002');


/*
q10
```

```
change employee salary, triggers modify_employee, check_wage_1
*/
UPDATE employee
SET hourly_rate = 1750
WHERE ird_number = '023-842-366';


/*
q10
change employee salary, triggers modify_employee, check_wage_1
*/
UPDATE employee
SET hourly_rate = 1500
WHERE ird_number = '024-613-323';

/*
q11
remove employee, triggers delete  employee
*/
DELETE FROM employee
WHERE ird_number = '055-923-819';


/*
q11
remove employee, triggers delete_employee
*/
DELETE FROM employee
WHERE ird_number = '013-643-923';
```

Source code load.sql:

```
DROP TABLE qualifications_type;
DROP TABLE qualifications;
DROP TABLE book_tran;
DROP TABLE transactions;
DROP TABLE customer;
DROP TABLE postcode;
DROP TABLE employee;
DROP TABLE employee_wage;
DROP TABLE supplies;
DROP TABLE supplier;
DROP TABLE book;
DROP table bookstore;




CREATE TABLE bookstore
(storeID     VARCHAR2(7) PRIMARY KEY,
city       VARCHAR2(20)  NOT NULL,
address     VARCHAR2(30)   NOT NULL,
account     CHAR(15)      NOT NULL,
date_opened   DATE     ,
total_salary    NUMBER(8) NOT NULL);

INSERT INTO bookstore VALUES
('0001', 'Milton', '33 Union Street', '0234-9871-8373', TO_DATE('05/22/1999','MM/DD/YYYY'), 0);
INSERT INTO bookstore VALUES
('0002', 'Bluff', '99 Oyster Road', '0453-1543-8532', TO_DATE('01/08/1998','MM/DD/YYYY'), 0);
```

```
INSERT INTO bookstore VALUES
('0003', 'Invercargill', '33 Dee Street', '0324-9553-8443', TO_DATE('06/14/1997','MM/DD/YYYY'), 0);
INSERT INTO bookstore VALUES
('0004', 'Waihola', '21 Lake Road', '0334-9321-7673', TO_DATE('12/14/2003','MM/DD/YYYY'), 0);
INSERT INTO bookstore VALUES
('0005', 'Gore', '11 Bogan Street', '0854-6354-9142', TO_DATE('12/24/2001','MM/DD/YYYY'), 0);
INSERT INTO bookstore VALUES
('0006','Temuka', '69 Kina Ave',  '0534-9143-6453', TO_DATE('10/31/2009','MM/DD/YYYY'), 0);



CREATE TABLE book
(title    VARCHAR2(30) NOT NULL,
isbn   CHAR(17)                    PRIMARY KEY,
fname    VARCHAR2(15) NOT NULL,
middle_init    CHAR,
lname    VARCHAR2(15) NOT NULL,
price    NUMBER(5), /*Currency*/
amount_in_stock   NUMBER(2));

INSERT INTO book VALUES
('Rusty Bed Springs', '326-1-234923-21-2', 'I','P','Knightley','2950', '2');
INSERT INTO book VALUES
('Snakes of the World', '321-1-234333-21-8', 'Anna','','Conda','2250', '5');
INSERT INTO book VALUES
('Tyrrants of the Potatoes', '336-1-285647-32-6', 'Dic','','Tater','1900', '12');
INSERT INTO book VALUES
('Trees', '284-1-573847-98-4', 'I','M','Board','2950', '5');
INSERT INTO book VALUES
('Robotics Handbook', '634-2-125445-65-2', 'Anne','D','Roid','7600', '3');
INSERT INTO book VALUES
('Windy Nights', '343-1-234352-21-2', 'Gale','','Force','4590', '5');
INSERT INTO book VALUES
('Lion Tamming', '323-3-323434-76-7', 'Claud','B','Ottem','2950', '20');



CREATE TABLE supplier
(bank_account_number    CHAR(18)    PRIMARY KEY,
company_name VARCHAR2(30) NOT NULL,
contact_number CHAR(10));

INSERT INTO supplier VALUES
('39-6443-9454523-48','National Scholastic','034191123');
INSERT INTO supplier VALUES
('33-3456-9482743-32','Mills and Boon','035763832');
INSERT INTO supplier VALUES
('26-6843-4856284-68','Paperback Writers','04457484');



CREATE TABLE supplies
(sbank_account_number CHAR(18) REFERENCES supplier (bank_account_number),
bisbn CHAR(17) REFERENCES book(isbn),
CONSTRAINT supplies_pk PRIMARY KEY(sbank_account_number, bisbn));

INSERT INTO supplies VALUES
('39-6443-9454523-48','326-1-234923-21-2');
INSERT INTO supplies VALUES
('39-6443-9454523-48','321-1-234333-21-8');
```

```
CREATE TABLE employee_wage
(weekly_hours   NUMBER(2),
hourly_rate    NUMBER(5),
wage NUMBER (8) default 1000,
CONSTRAINT employee_wage_pk PRIMARY KEY(weekly_hours, hourly_rate));


INSERT INTO employee_wage VALUES('38', '1525','57950');
INSERT INTO employee_wage VALUES('38', '1600','60800');
INSERT INTO employee_wage VALUES('38', '1700','64600');
INSERT INTO employee  wage VALUES('32', '1800','57600');
INSERT INTO employee_wage VALUES('32', '1900','60800');
INSERT INTO employee_wage VALUES('38', '1500','60000');
INSERT INTO employee_wage VALUES('40', '1700','68000');
INSERT INTO employee_wage VALUES('35', '1750','61250');
INSERT INTO employee_wage VALUES('35', '1850','64750');


CREATE TABLE employee
(fname    VARCHAR2(15) NOT NULL,
middle_init    CHAR,
lname    VARCHAR2(15) NOT NULL,
ird_number      CHAR(11)      PRIMARY KEY,
contact_number  CHAR(10),
weekly_hours   NUMBER(2),
hourly_rate    NUMBER(5) NOT NULL, /*Currency*/
bookstoreID VARCHAR2(7) CONSTRAINT bookstore_ID_constraint REFERENCES bookstore(storeID),
CONSTRAINT wage_constraint FOREIGN KEY(weekly_hours, hourly_rate) REFERENCES
employee_wage(weekly_hours, hourly_rate));




/*
* Run the trig.sql file to implement triggers for employee wage and employee table.
 */



INSERT INTO employee VALUES
('John','B','Good', '024-613-323',      '0212344505', '38', '1525', '0001');
INSERT INTO employee VALUES
('Debbie','D','Dallas', '023-543-765',   '0215739542', '32', '1800', '0002');
INSERT INTO employee VALUES
('Tom','N','Mates', '013-643-923',      '0273938492', '38', '1600', '0003');
INSERT INTO employee VALUES
('Rebbecca','B','Smith', '075-142-345',  '0214847395', '40', '1700', '0004');
INSERT INTO employee VALUES
('Greg','T','Somerville', '087-681-765', '0270394722', '38', '1500', '0005');
INSERT INTO employee VALUES
('Todd','A','BlackAdder', '091-813-913', '0215738375', '35', '1750', '0006');
INSERT INTO employee VALUES
('Wayne','','Kerr', '023-842-366',      '0273231043', '35', '1850', '0001');
INSERT INTO employee VALUES
('Leroy','J','Brown', '073-834-552',    '0215551234', '32', '1900', '0002');
INSERT INTO employee VALUES
('Ying','G','Brown', '055-923-819',     '0214984833', '38', '1600', '0003');


/**
Randomly select 1 addresses from bookstore
```

```
select address from (select * from bookstore order by DBMS_RANDOM.RANDOM) WHERE rownum < 2;
*/

/**
select weekly_hours, hourly_rate from (select * from employee_wage order by DBMS_RANDOM.RANDOM) WHERE
rownum < 2;
*/

CREATE TABLE postcode
(postcode NUMBER (4)          PRIMARY KEY,
suburb VARCHAR (15),
city VARCHAR (15));

INSERT INTO postcode VALUES
(9016, 'Dunedin City', 'Dunedin');
INSERT INTO postcode VALUES
(9012, 'South Dunedin', 'Dunedin');



CREATE TABLE customer
(street_number NUMBER(5),
Street_name VARCHAR2(30),
postcode NUMBER(4) NOT NULL REFERENCES postcode(postcode),
customer_id CHAR (7)          PRIMARY KEY,
fname VARCHAR(15) NOT NULL,
lname VARCHAR(15) NOT NULL,
phone CHAR (10)
);

INSERT INTO customer VALUES
(22, 'Strawberry Lane', 9016, '0007365','Chubby','Checker', '0212546798');
INSERT INTO customer VALUES
(16, 'Princes Street', 9012, '0046290','Slim','Dusty', '0279843873');
INSERT INTO customer VALUES
(11, 'Boiling Down Road',9012,'0002233','Jimmy','Johns','');
INSERT INTO customer VALUES
(17,'Duchess Ave',9016,'0000010','Callum','Grimmer','0223280679');
INSERT INTO customer VALUES
(14,'Findlayson Road',9012,'0022056','Tim','Shadbolt','0272524455');
INSERT INTO customer VALUES
(25,'River Street',9016,'0024789','Joseph','Parker','');
INSERT INTO customer VALUES
(560,'George Street',9016,'0001010','David','Clark','');
INSERT INTO customer VALUES
(34, 'Midland Street',9012,'0033210','Dave','Brubeck','');
INSERT INTO customer VALUES
(131,'Queen Street',9016,'0035670','Trent','Brown','0223220987');
INSERT INTO customer VALUES
(11,'Pitt Street',9016,'0668220','Sammy','Dee','0274429824');
INSERT INTO customer VALUES
(2,'Wigan Street',9012,'0096210','Michael','Peterson','0211197862');
INSERT INTO customer VALUES
(62,'Robertson Street',9016,'0000223','Foxy','Brown','0274542211');



CREATE TABLE transactions
(TDATE DATE NOT NULL,
 TTIME DATE NOT NULL,
transaction_number CHAR (18)    PRIMARY KEY,
eird_number CHAR(11)  REFERENCES employee (ird_number),
```

```
ccustomer_id CHAR (7) REFERENCES customer (customer_id)
);



CREATE TABLE book_tran
(bisbn CHAR (17)   REFERENCES book(isbn),
ttransaction_number CHAR (18)  REFERENCES transactions(transaction_number),
CONSTRAINT book_tran_pk PRIMARY KEY(bisbn, ttransaction_number));



CREATE TABLE qualifications (
eird_number CHAR (11) REFERENCES EMPLOYEE(ird_number),
qname VARCHAR(30),
date_received DATE,
expiry_date DATE,
CONSTRAINT qualifications  pk PRIMARY KEY(eird_number, qname));


INSERT INTO qualifications VALUES
((select IRD_NUMBER from (select * from employee order by DBMS_RANDOM.RANDOM) WHERE
ROWNUM < 2),
 'First Aid', TO_DATE('22-05-2013','DD-MM-YYYY'), TO_DATE('22-05-2015','DD-MM-YYYY'));
INSERT INTO qualifications VALUES
((select IRD_NUMBER from (select * from employee order by DBMS_RANDOM.RANDOM) WHERE
ROWNUM < 2),
 'BSci', TO_DATE('25-10-1999','DD-MM-YYYY'), TO_DATE(''));

CREATE TABLE qualifications_type
(eird_number CHAR(11),
qname VARCHAR(30),
qtype VARCHAR(20),
CONSTRAINT qualifications_type_pk PRIMARY KEY (eird_number, qname, qtype),
CONSTRAINT qualifications_foreign_key FOREIGN KEY (eird_number, qname) REFERENCES
QUALIFICATIONS(eird_number, qname));

INSERT INTO qualifications_type VALUES
(  (select eird_number from QUALIFICATIONS where rownum = 1),
 (select qname from QUALIFICATIONS where rownum = 1),
 'Health and Safety');
INSERT INTO qualifications_type VALUES
(  (select eird_number from QUALIFICATIONS where rownum = 1),
      (select qname from QUALIFICATIONS where rownum = 1),
 'bachelors degree');
/**
ask teach why the rownum = 2 return null?
*/



@trig.sql
```