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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
STANDARD LEVEL
PAPER 1

Monday 17 November 2014 (afternoon)

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

* Do not open this examination paper until instructed to do so.
* Answer three questions. Each question is worth *[20 marks]*.
* The maximum mark for this examination paper is *[60 marks]*.

*Answer **three** questions. Each question is worth [20 marks].*

1. **E-receipts**

   In some countries retailers give customers the option of an emailed receipt (e-receipt) as well as a paper receipt. To be included in this email receipt system, a customer provides personal information to the store cashier, which is entered into the store database.

   Once registered on the system, the customer tells the cashier their first name and last name every time they make a purchase.
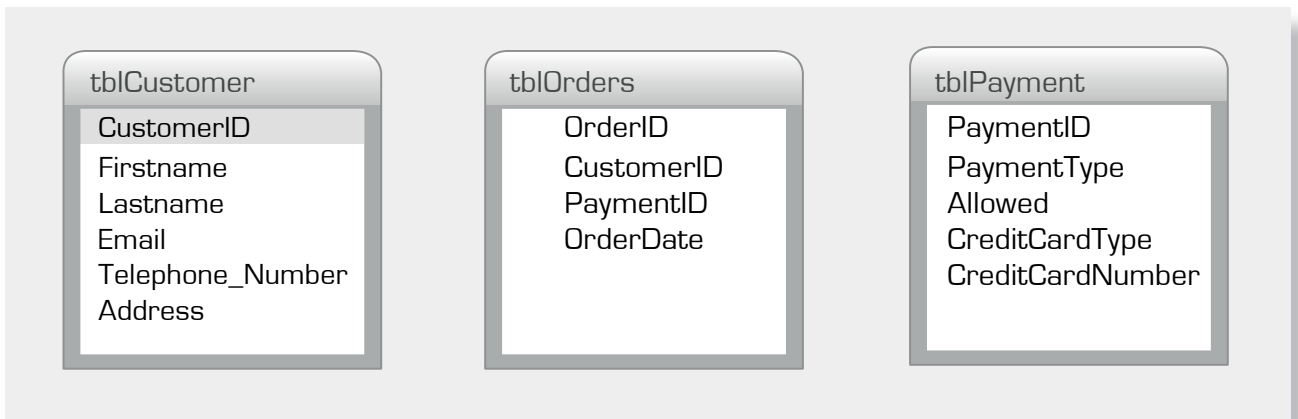
   Image removed for copyright reasons

   (This question continues on the following page)

(Question 1 continued)

As customers begin to collect more e-receipts from different stores in their inbox, they need a method of organizing their e-receipts. Websites such as Myreceipts.com can assist customers with this problem. The data held by each store is shared with Myreceipts.com upon customer approval.

One store, RAX, has a database which is used to keep a record of customers' visits to the stores. This part of the relational database is illustrated below.

tblCustomer	tblOrders	tblPayment
CustomerID	OrderID	PaymentID
Firstname	CustomerID	PaymentType
Lastname	PaymentID	Allowed
Email	OrderDate	CreditCardType
Telephone_Number		CreditCardNumber
Address		

[Source: adapted from http://bronto.com/blog/email-marketing-strategy/electronic-receipts-ereceipts-email-marketing,
15 November 2012]

(a) (i)   State the name of the primary key field of the table *tblOrders*.   *[1]*

    (ii) State the relationship between the tables *tblOrders* and *tblPayment*.   *[1]*

    (iii) State a field type that would be suitable for *Firstname* in the table *tblCustomer*.   *[1]*

    (iv) State a field type that would be suitable for *Email* in the table *tblCustomer*.   *[1]*

    (v)   State a field type that would be suitable for *Allowed* in the table *tblPayment*.   *[1]*

    (vi) State a field type that would be suitable for *Telephone_Number* in the table *tblCustomer*.   *[1]*

(b) Explain **three** social/ethical considerations for RAX when storing the e-receipt data collected from customers in the store database.   *[6]*

(c) To what extent is an e-receipt system such as at Myreceipt.com beneficial to the customer?   *[8]*

2.   Magic Medicine Cabinet

A new product is being developed for your bathroom, the Magic Medicine Cabinet (MMC). It is a *smart* appliance for supporting family health care. It includes a number of technologies that can remind the user to take the right medication, track vital signs, access up-to-date personalized health information, and interact online with doctors and pharmacists. John Dudley has recently purchased one for the family.

Photo removed for copyright reasons

The MMC recognizes which medication John is holding, and warns him if he is taking the wrong medication.

Photo removed for copyright reasons

Measuring blood pressure using the monitoring device attached to the MMC.

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(Question 2 continued)

The MMC can remind John to take medication through both audio output and the embedded display while he is looking in the mirror. The implementation of the MMC incorporates the following technologies:

- face recognition of people who approach the cabinet
- radio frequency identification (RFID) based *smart* labels (tags) attached to the individual medication
- vital sign sensors to monitor blood pressure and heart rate
- audio output to speak the text that is shown on the cabinet display.

John interacts with the MMC through its touch-sensitive screen, voice input, and the different sensors such as those to monitor blood pressure.

Some health authorities are considering introducing the MMC in remote areas or in the homes of patients who cannot easily get to a doctor's office.

[Source: adapted from www.guardian.co.uk/technology/2012/aug/30/ifa-2012-gadgets
and www.accentureconsulting.ie/.../PDF/magicmedicinecabinethuc99.pdf]

(a) (i) Identify **two** advantages of using RFID *smart* labels (tags) in the MMC. *[2]*

(ii) Identify **four** steps involved in the face recognition process used by the MMC. *[4]*

(b) John's wife wants to take her blood pressure. Compare **two** methods of training that could be provided in using the blood pressure monitoring device. *[6]*

(c) Discuss the advantages and disadvantages to the patient of using the MMC as a health care tool. *[8]*

3. **Who has my data?**

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(a) (i) Identify **four** characteristics that may be required by a system when setting up a strong password. *[4]*

(ii) Passwords are often set to expire periodically, such as every 90 days. Identify **two** reasons why passwords are set to expire on a regular basis. *[2]*

(b) Compare the security of typing a password with the security of using a finger scan. *[6]*

(c) To what extent is it acceptable for the State of Furlong to hold sensitive data in its criminal database? *[8]*

4. Donating or disposing of old computers

The C&R Company will be buying 200 new computers and donating their existing equipment to a school in Haiti. The peripheral devices will be donated along with the computers.

Some C&R employees store personal data on the hard disk (drive) of their computer. This data must be backed up before it can be deleted. The school will decide what kind of operating system will be installed on the donated computers.

The company will deliver completely functional computers to the school in Haiti.

The school in Haiti will be responsible for acquiring and installing all software except for the operating system.

(a) (i) Identify **two** peripheral devices. *[2]*

  (ii) Identify **two** methods the C&R Company can use to save data from the hard disk before they delete it. *[2]*

  (iii) Identify **two** methods to remove all the information from these hard disks that does not physically destroy the disk. *[2]*

(b) Explain **three** factors that could influence the decision by the school in Haiti to use open source or proprietary software on the donated computers. *[6]*

(c) Other companies are considering whether it is better to donate or dispose of obsolete equipment. Evaluate these **two** options. *[8]*

5.   Using social networking data

Social networking sites, such as *Twitter*, can provide indications of a potential disease outbreak faster than traditional disease surveillance methods. By the time public health alerts are issued and the media picks up the story, people have already been talking about an illness for several weeks on social networking sites. Web applications use *Twitter* to monitor and produce automated reports on what illnesses people are talking about most frequently.

Having real-time information publicly available through social networking sites like *Twitter* could be revolutionary for health officials watching out for the first clues to new, emerging infectious diseases in their communities and for modernizing public health systems.
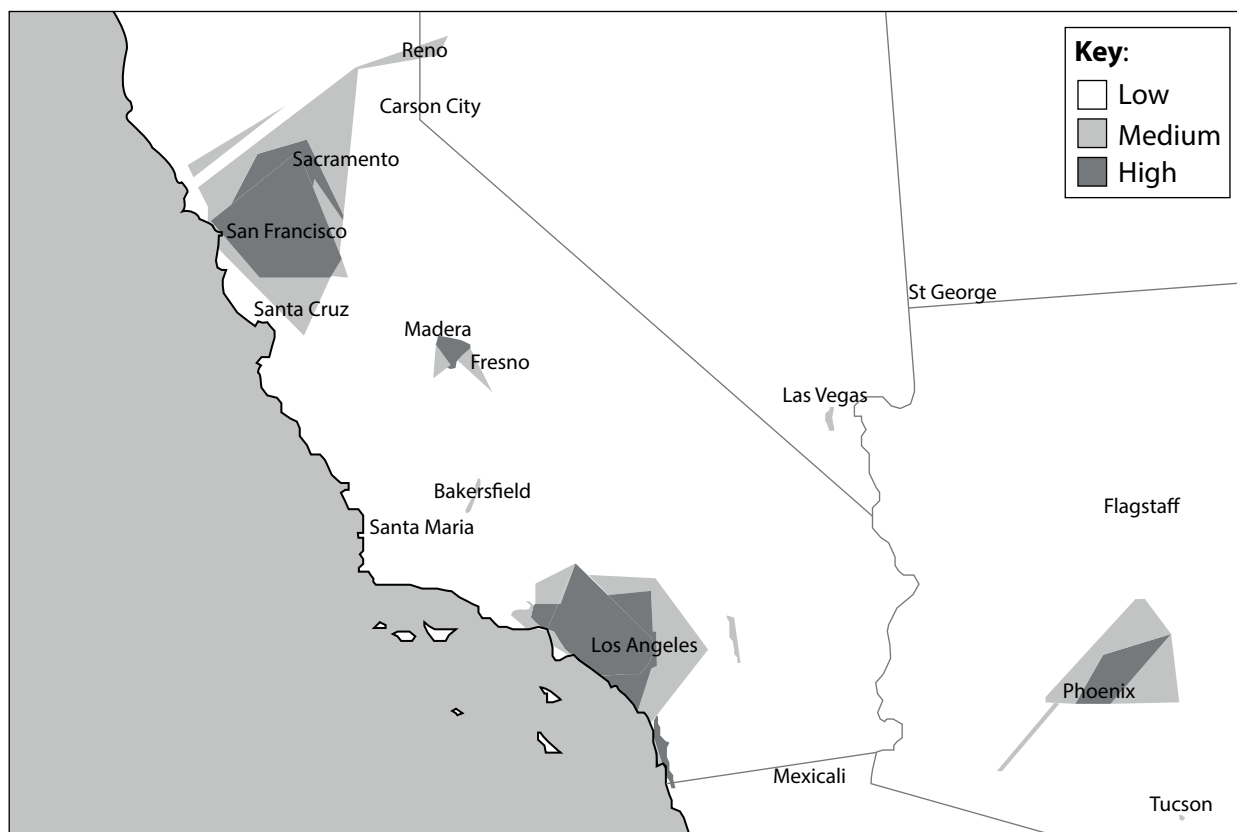
Map showing the frequency of the word "flu" in Twitter postings.

[Source: adapted from www.good.is/posts/using-twitter-to-track-infectious-diseases/ 15 November 2012
Used with permission from GOOD International]

The shaded areas show the frequency of use of the keyword "flu" based on the location of the devices that were used to make the *Twitter* posting.

Using data mining, early identification of health trends can help minimize the spread of disease. Health officials use web applications to collect and present the data.

(This question continues on the following page)

(Question 5 continued)

    (a)   (i)   Identify **two** characteristics of social networking. *[2]*

            (ii)   Identify **two** data fields that could be collected and stored in a database from the *Twitter* postings. *[2]*

            (iii)   Identify **two** ways that a social networking site such as *Twitter* can determine your location. *[2]*

    (b)   Explain the privacy concerns for individuals when data mining is used to detect illnesses. *[6]*

    (c)   Although the *Twitter* reporting system is not managed by the Californian authorities, they are using it to identify areas of high concentrations of flu in the state.

            To what extent can data collected by the *Twitter* reporting system benefit the California health authority? *[8]*