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Benodigdhede vir hierdie vraestel / Requirements for this paper:				Oopboek eksamen / Open book examination:	
Multikeusekaarte / Multi choice cards:		Nie-programmeerbare sakrekenaar / Non-programmable calculator:	√		
Grafiekpapier / Graphic paper:		Draagbare rekenaar / Laptop:			

EKSAMEN / EXAMINATION:	**Eerste Geleentheid / First Opportunity Nov 2015**	KWALIFIKASIE / QUALIFICATION:	**B.Sc.(IT)**
MODULEKODE / MODULE CODE:	**ITRW225**	DUUR / DURATION:	**3 Ure / Hours**
MODULE BESKRYWING / SUBJECT:	**Systems Analysis & Design II / Stelselontleding & -ontwerp II**	MAKS / MAX: PUNTE / MARKS:	**100**
EKSAMINATOR(E) / EXAMINER(S):	**Imelda Smit**	DATUM / DATE:	**09/11/2015**
MODERATOR(E) / MODERATOR(S):	**Prof Roelien Goede**	TYD / TIME:	**9:00**

Answer all the questions.

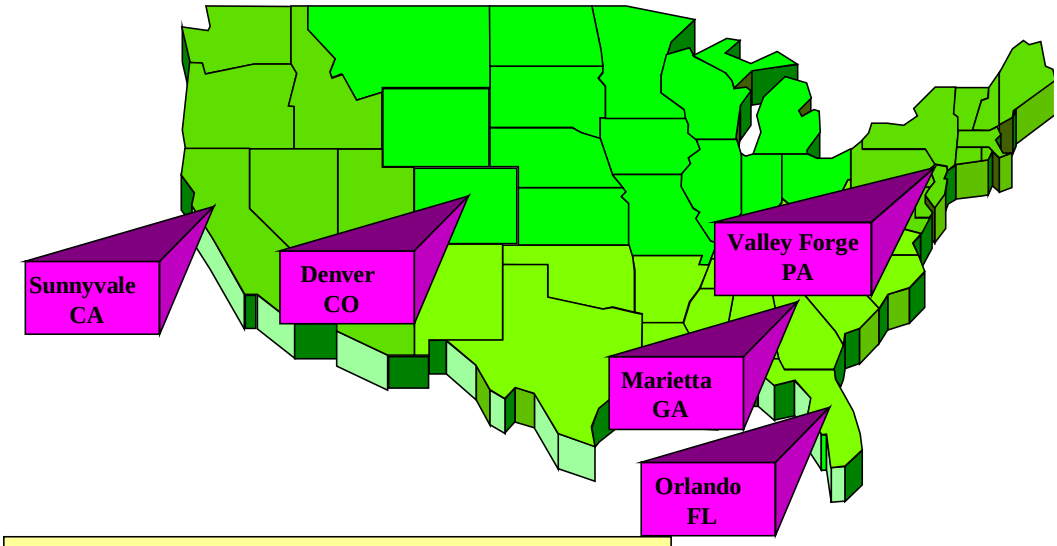
Beantwoord al die vrae.

Read the case study before answering the questions | Lees die gevallestudie voordat jy die vrae beantwoord:

💻 *Case Background*

A-1 Information Systems (IS) headquartered in Orlando, Florida, employs approximately 4,100 employees throughout the United States. A-1 IS provides leading edge technologies, distributed computing, mainframe, micro, communication, and consulting services to its parent company A-1 Corporation, headquartered in Bethesda, Maryland, as well as to external customers including the U.S. government. In addition A-1 IS is responsible for the development and support of all the internal systems that support their day-to-day business processes and operations.

A-1 IS currently operates in five sites across the nation and they are as follows:



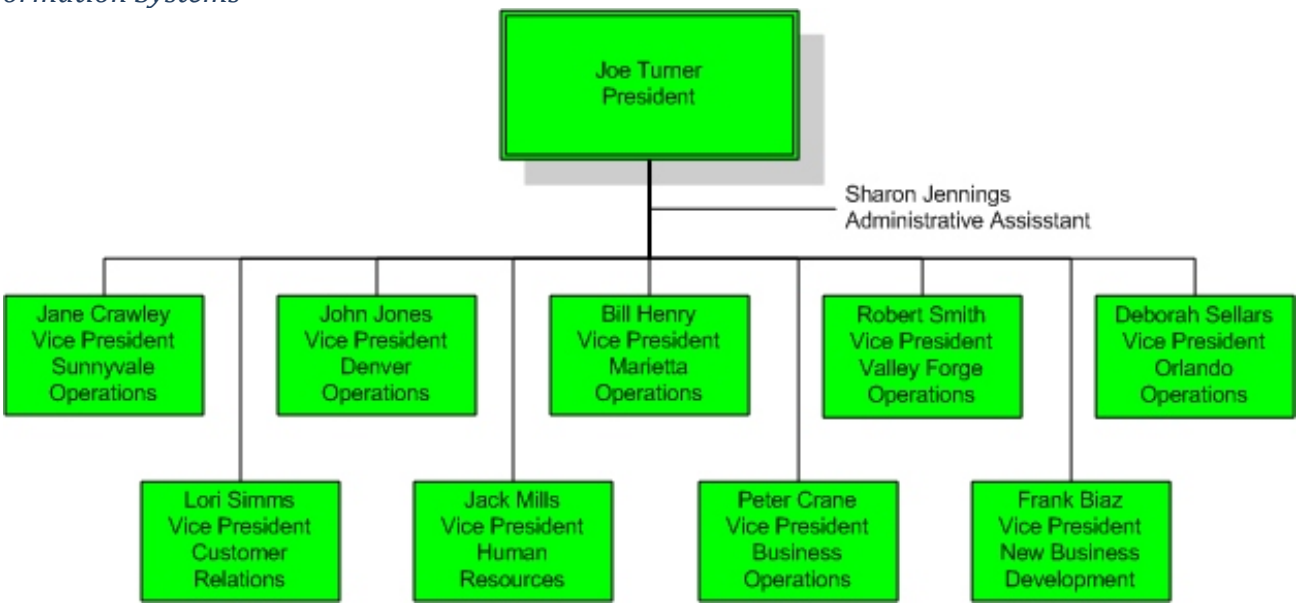
Sunnyvale, CA -	**725 employees**
Denver, CO -	**770 employees**
Valley Forge, PA -	**1,056 employees**
Marietta, GA -	**171 employees**
Orlando, FL -	**1,475 employees**

Each site is responsible for servicing and supporting the customers in its region, as well as its internal employees.

A-1 IS has experienced a 15 percent increase in employees over the past two years, and long-range projections show that trend continuing for the next three years.

💻 ***Organisation Structure***

Information Systems



Information Systems Facilities

The information architecture for A-1 IS uses the following standards:

- Desktop PC— IBM ThinkCentre S series
  - Pentium 4 processor
  - 512 megabytes of RAM
  - 80 GB disk drive
  - 17 or 19 inch monitors
  - Operating system — MS Windows XP Pro
  - Standard Tools — MS Office suite (2003)
  - Internet Browser — IE 6
  - Virus Protection — Norton AV
  - E-mail — MS Outlook
- Servers — IBM xSeries 336
  - Intel Xeon processor
  - 4 GB of RAM (16GB in Orlando)
  - 200 GB in hard disk storage (via RAID 5 configuration)
  - Operating system — MS Windows Server 2003
  - Database Management System — Oracle 10g
- Printers — Hewlett Packard LaserJet and PaintJet classes.
- LAN – Each office employs a wired and wireless Ethernet LAN
- WAN – A VPN connects each office to the main office in Orlando

Notes:

Each site has comparable hardware and software, and the employee to micro ratio is 1-to-1.

Many employees, including most managers, use IBM notebooks with docking stations as their desktop computer. Each notebook is comparable to Gateway desktop specifications.

The Problem

Due to the tremendous growth the company has experienced in recent years, it has recognized that to ensure the continued success of servicing internal as well as external customers, it needed to develop a strategic plan and vision for the use and modernization of its computing resources. The challenges of creating centralized systems across all five IS sites to support business practices that are common if not identical across the sites, further emphasize the need.

In January 2012 a strategic plan to modernize the company's resources was presented to executive management. This document included a multi-phased plan to reengineer the current systems to use state-of-the-art technology and to provide a showcase of systems that eventually could be delivered across the whole corporation.

Phase 1 of the plan consisted of reengineering all systems related to Human Resources, which included employee information, time and attendance, and payroll. Task 1 of this phase is the development of the Employee Self-Service System (ESSS), a system that will house the repository of employee master data. This system would provide the capability for each employee to maintain his or her own information regarding address and telephone numbers, emergency contact information, payroll deduction options, and savings bond purchases.

Current practices now have each of these changes being processed by an extensive manual effort in which Human Resource administrators fill out forms and input the data. This manual effort often results in a time lag of several days between the time the employee submits the forms and the update of the information in the computer. This delay has caused several problems, including unacceptable lag time in implementing payroll deduction changes and company mailings (including pay checks) being sent to the wrong address. Another problem of the present system is the employee directory, which is printed every six months. It seems to be out-of-date as soon as it arrives with missing information on new employees, and incorrect information on employees who have changed addresses or been transferred.

The plan for the new system is to provide the capability for an employee to update data themselves in real time, the problems mentioned above can be reduced, if not eliminated. The printed employee directory will be replaced by an intranet-based online directory that will be driven by the ESSS database and always up-to-date.

Vraag | Question 1 < SYSTEMS DESIGN ★ STELSELONTWERP > [6]

You used **prototyping** as an analysis and design tool for your group project. The prototyping approach is an iterative process having a number of advantages. Discuss these advantages.

Jy het **prototipering** as analise-en-ontwerphulpbron vir jul groepprojek gebruik. Die prototiperingsbenadering is 'n iteratiewe proses wat 'n aantal voordele inhou. Bespreek hierdie voordele.

Vraag | Question 2 <APPLICATION ARCHITECTURE & MODELLING ★ TOEPASSINGSARGITEKTUUR & -MODELLERING> [14]

Read the narrative and study the Physical Data Flow Diagram (P-DFD) for the "**Enter New Employee Profile**" process.

Lees die beskrywing en bestudeer die Fisiese Datavloeidiagram (F-DVD) vir die "**Enter New Employee Profile**" proses.

2.1 Use the **answer sheet** to **make corrections** to the P-DFD supplied on it. Number each type of correction.	7	2.1 Gebruik die **antwoordblad** om **regstellings** op die F-DVD daarop verskaf, aan te bring. Gee elke tipe regstelling 'n nommer.
2.2 **Compile a set of guidelines** to help with the compilation of a P-DFD, reflecting the corrections you made. Number the guidelines according to your answer to the question in 2.1.	7	2.2 **Stel 'n stel riglyne saam** om te help met die samestelling van 'n F-DVD, wat die regstellings wat jy gemaak het, reflekteer. Nommer die riglyne volgens jou antwoord op 2.1 se vraag.

IMPORTANT INFORMATION: The selected architecture for the ESSS will employ an Oracle back-end database and a front-end Java web application. The portions of the web application that must be available to employees at home will run over the Internet. The rest will be an intranet application running over the corporate WAN.

The first day an employee begins work, the employee will manually fill out an Employee Profile form (see Exhibit 4.2 in Milestone 4), a Miscellaneous Payroll Deduction form (see Exhibit 4.4 in Milestone 4). These paper forms are then routed to the Staffing Department who add it to a paper file that has been started with the employee's job offer and salary/wage information.

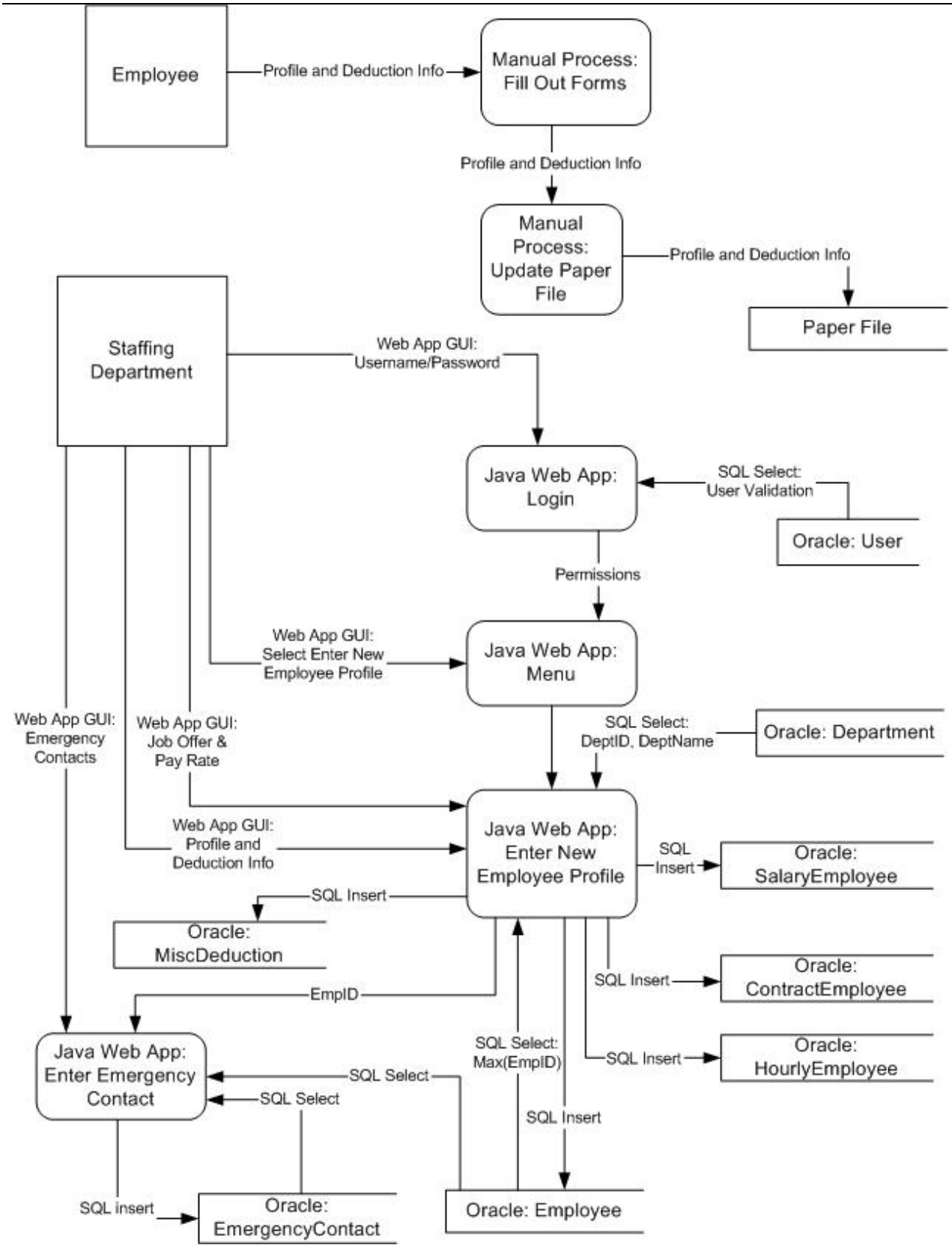
A member of the Staffing Department then launches the ESSS intranet application. The application will prompt for a user name and password, which must be verified. Menu options will then be displayed according to that user's permissions.

The user will click the Enter New Employee Profile link. A series of text boxes will prompt for the general employee information, pay rate information, and all possible miscellaneous payroll deductions. A dropdown box will allow the user to select the new employee's department from a list. When the web page is submitted, the data will be inserted to the various database tables. The EmpID is assigned sequentially, incrementing the current highest number in the Employee table.

The user will then be redirected to a page for entering emergency contact information. This page will display identifying information for the employee at the top, list all previously entered emergency contacts, and provide text boxes for entering a new emergency contact. The user can enter a new emergency contact and click the submit button to have the new contact inserted. The list will then be redisplayed with the updated information. The user will stay on this screen until the Exit button is clicked.

Student name:

Student number:



Vraag | Question 3 < DATABASE DESIGN ★ DATABASISONTWERP> [18]

Refer to the case study given.

3.1 Data and its integrity is crucial in any database environment. Three types are listed below. **Explain** how the integrity of each should be protected. Also **illustrate** your answer from the case study.

10

Verwys na die gevallestudie gegee.

3.1 Data en die integriteit daarvan is van uiterste belang in enige databasisomgewing. Drie tipes word hieronder gelys. **Verduidelik** hoe die integriteit van elk beskerm behoort te word. **Illustreer** ook jou antwoord vanuit die gevallestudie.

Use the following table to guide you:

Integrity	**Subtype**	**Explanation**	**C/S Example**
Key			
Domain			
Referential			

3.2 According to the database capacity planning steps you studied, what is the anticipated database capacity? **List the steps and show your calculations.**

Use the sections of the supplied normalised logical data model to guide you. The sizes of the tables are indicated on the ERD.

The expected rate of growth in the number of records needed to be calculated over three years as follows: 20% in the first year, 15% in the second year and 15% in the third year.

Work with one decimal point.

You may use the java types table provided.

Make clear assumptions when necessary.

8

3.2 Wat is die verwagte databasiskapasiteit volgens die databasiskapasiteitsbeplanningstappe wat jy bestudeer het? **Lys die stappe en wys jou berekenings.**

Gebruik die dele van die genormaliseerde logiese data model om jou te rig. Die groottes van die tabelle is op die EVD aangedui.

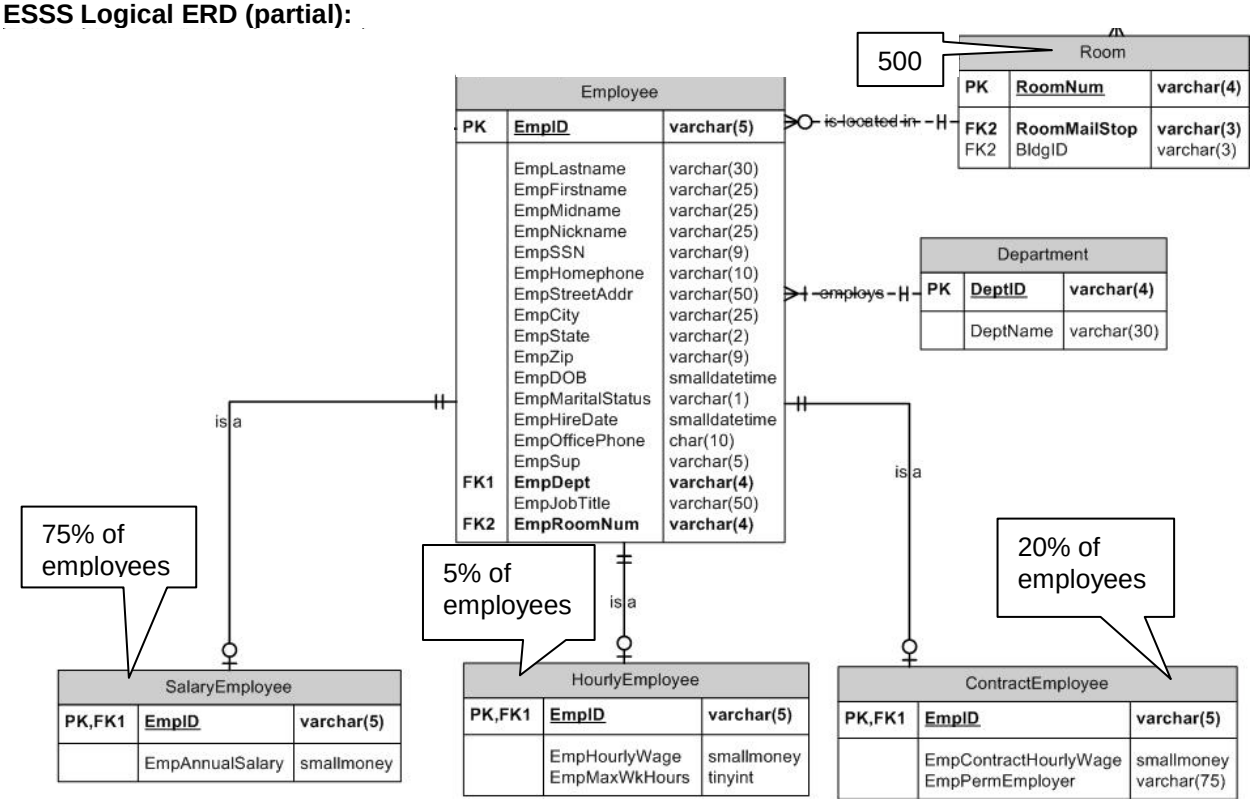
Die verwagte groeikoers in die aantal rekords moet oor drie jaar bereken word, soos volg: 20% in die eerste jaar, 15% in die tweede jaar en 15% in die derde jaar.

Werk met een desimale breuk.

Jy mag die java tipes tabel verskaf, gebruik.

Maak duidelike aannames wanneer nodig.

ESSS Logical ERD (partial):



Primitive Types					
Type Name	**Wrapper class**	**Value**	**Range**	**Size**	**Default Value**
`byte`	`java.lang.Byte`	integer	−128 through +127	8-bit (1-byte)	`0`
`short`	`java.lang.Short`	integer	−32,768 through +32,767	16-bit (2-byte)	`0`
`int`	`java.lang.Integer`	integer	−2,147,483,648 through +2,147,483,647	32-bit (4-byte)	`0`
`long`	`java.lang.Long`	integer	−9,223,372,036,854,775,808 through +9,223,372,036,854,775,807	64-bit (8-byte)	`0`
`float`	`java.lang.Float`	floating point number	±1.401298E−45 through ±3.402823E+38	32-bit (4-byte)	`0.0`
`double`	`java.lang.Double`	floating point number	±4.94065645841246E−324 through ±1.79769313486232E+308	64-bit (8-byte)	`0.0`
`boolean`	`java.lang.Boolean`	Boolean	`true` or `false`	8-bit (1-byte)	`false`
`char`	`java.lang.Character`	UTF-16 code unit (BMP character or a part of a surrogate pair)	`'\u0000'` through `'\uFFFF'`	16-bit (2-byte)	`'\u0000'`

Assume: TinyInt ==> int VarChar = Char SmallDateTime ==> 6 bytes SmallMoney ==> float

Vraag | Question 4 < GUI ★ GGK > [20]

On an annual basis, Joe Turner from A-1 IS needs reports on work done and progress made in the business. State four (4) reports you plan the phase 1 development to report on. Also mention which chart types you will use to ensure a visual presentation. Motivate each choice. Show the basic output design for each report by stating example data.

Joe Turner van A-1 IS benodig jaarlikse verslae oor werk wat gedoen is en die vordering wat gemaak is in die besigheid. Noem vier (4) verslae wat jy beplan vir die fase 1 ontwikkeling om oor verslag te doen. Sê ook watter grafiek jy sal gebruik om 'n visuele voorstelling te verseker. Motiveer elke keuse. Wys die basiese uitvoerontwerp vir elke verslag deur voorbeeld data te gebruik.

You may use the following as a guideline for your answer:

Report	Selected chart type/types	Motivation of chart type choice	Example output report
Report 1	Relevant chart type/types	Motivation of chart type choice	Example output report 1
...	...	...	...
Report 4	Relevant chart type/types	Motivation of chart type choice	Example output report 4

Vraag | Question 5 < IMPLEMENTATION & MAINTENANCE ★ IMPLEMENTERING & ONDERHOUD > [17]

5.1 Compile a plan for training the users.	9	5.1 Stel 'n plan saam vir die opleiding van gebruikers.
5.2 Which implementation methods for outputs did you use in your project system?	2	5.2 Watter implementeringsmetodes vir uitvoer het jy in jul projekstelsel gebruik?
5.3 Name the three crucial general principles for input design.	3	5.3 Noem die drie kritiese beginsels vir toevoerontwerp.
5.4 Name the three important guidelines to be followed regarding the tone of a system's dialogue.	3	5.4 Noem die drie belangrike riglyne wat gevolg moet word in verband met die toon van 'n stelsel se dialoog.

Vraag | Question 6 < OBJECT ORIENTED ANALYSIS & DESIGN ★ OBJEKGEORIËNTEERDE ANALISE & - ONTWERP> [25]

6.1 Compile an object association matrix.	10	6.1 Stel 'n objekverwantskapssmatriks saam.
6.2 Use the Logical ERD given in question 3 to compile a design class diagram. Mention the steps you follow. Make assumptions where necessary.	15	6.2 Gebruik die Logiese EVD gegee in vraag 3 om 'n analise-klasdiagram saam te stel. Noem die stappe wat jy volg. Maak aannames waar nodig.