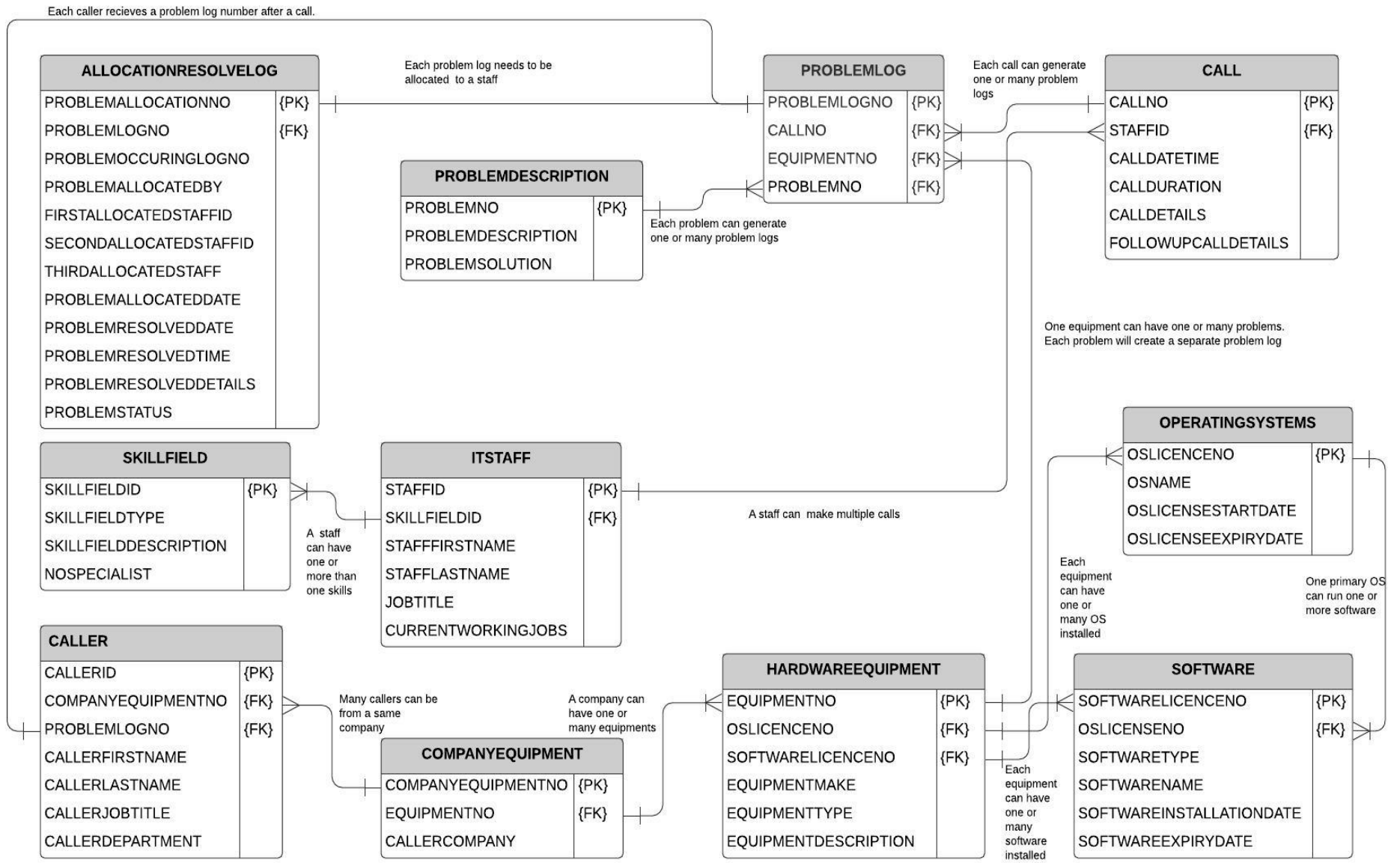# Task 1 – Entity Relationship Diagram Updated

DataBase Systems Assignment Part One
Resubmitted
Muhammad Asif Khan

Each caller recieves a problem log number after a call.

ALLOCATIONRESOLVELOG

PROBLEMALLOCATIONNO	{PK}
PROBLEMLOGNO	{FK}
PROBLEMOCCURINGLOGNO	
PROBLEMALLOCATEDBY	
FIRSTALLOCATEDSTAFFID	
SECONDALLOCATEDSTAFFID	
THIRDALLOCATEDSTAFF	
PROBLEMALLOCATEDDATE	
PROBLEMRESOLVEDDATE	
PROBLEMRESOLVEDTIME	
PROBLEMRESOLVEDDETAILS	
PROBLEMSTATUS	

Each problem log needs to be allocated to a staff

PROBLEMDESCRIPTION

PROBLEMNO	{PK}
PROBLEMDESCRIPTION	
PROBLEMSOLUTION	

Each problem can generate one or many problem logs

PROBLEMLOG

PROBLEMLOGNO	{PK}
CALLNO	{FK}
EQUIPMENTNO	{FK}
PROBLEMNO	{FK}

Each call can generate one or many problem logs

CALL

CALLNO	{PK}
STAFFID	{FK}
CALLDATETIME	
CALLDURATION	
CALLDETAILS	
FOLLOWUPCALLDETAILS	

One equipment can have one or many problems. Each problem will create a separate problem log

SKILLFIELD

SKILLFIELDID	{PK}
SKILLFIELDTYPE	
SKILLFIELDDESCRIPTION	
NOSPECIALIST	

A staff can have one or more than one skills

ITSTAFF

STAFFID	{PK}
SKILLFIELDID	{FK}
STAFFFIRSTNAME	
STAFFLASTNAME	
JOBTITLE	
CURRENTWORKINGJOBS	

A staff can make multiple calls

OPERATINGSYSTEMS

OSLICENCENO	{PK}
OSNAME	
OSLICENSESTARTDATE	
OSLICENSEEXPIRYDATE	

Each equipment can have one or many OS installed

One primary OS can run one or more software

CALLER

CALLERID	{PK}
COMPANYEQUIPMENTNO	{FK}
PROBLEMLOGNO	{FK}
CALLERFIRSTNAME	
CALLERLASTNAME	
CALLERJOBTITLE	
CALLERDEPARTMENT	

Many callers can be from a same company

COMPANYEQUIPMENT

COMPANYEQUIPMENTNO	{PK}
EQUIPMENTNO	{FK}
CALLERCOMPANY	

A company can have one or many equipments

HARDWAREEQUIPMENT

EQUIPMENTNO	{PK}
OSLICENCENO	{FK}
SOFTWARELICENCENO	{FK}
EQUIPMENTMAKE	
EQUIPMENTTYPE	
EQUIPMENTDESCRIPTION	

Each equipment can have one or many software installed

SOFTWARE

SOFTWARELICENCENO	{PK}
OSLICENSENO	{FK}
SOFTWARETYPE	
SOFTWARENAME	
SOFTWAREINSTALLATIONDATE	
SOFTWAREEXPIRYDATE	

Task 2 – Relational Schema Updated

ALLOCATIONRESOLVELOG Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS	DATA_DEFAULT
1	PROBLEMLOGNO	CHAR(10 BYTE)	No	A foreign key that refers to ProblemLog(ProblemLogNo)	(null)
2	FIRSTALLOCATEDSTAFFID	CHAR(6 BYTE)	No	The first staff to resolve the given problem log.	(null)
3	SECONDALLOCATEDSTAFFID	CHAR(6 BYTE)	No	The problem log has been transferred to the second staff as it is not resolved	(null)
4	PROBLEMALLOCATEDBY	CHAR(6 BYTE)	No	The staff who will decide to allocate the problemlog.	(null)
5	PROBLEMSTATUS	CHAR(20 BYTE)	No	Problem staus which is either resolved or not_resolved	(null)
6	PROBLEMALLOCATEDDATE	DATE	No	Problem allocated date	(null)
7	PROBLEMRESOLVEDDATE	DATE	Yes	Problem resolved date	(null)
8	PROBLEMRESOLVEDTIME	NUMBER(3,0)	Yes	Number of days to resolve a problem log.	0
9	PROBLEMRESOLVEDDETAILS	VARCHAR2(100 BYTE)	No	Details of how the problem was solved.	NULL
10	THIRDALLOCATEDSTAFF	CHAR(6 BYTE)	No	The problem log has been transferred to the third staff as it is still not resolved.	(null)
11	PROBLEMALLOCATIONNO	CHAR(10 BYTE)	No	A primary key to allocate a problem log	(null)
12	PROBLEMOCCURINGLOGNO	CHAR(10 BYTE)	Yes	Log of occuring problems	(null)

ALLOCATIONRESOLVELOG Constraints

	CONSTRAINT...	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Foreign_Key	PROBLEMALLOCATIONLOG_FK1	(null)	PROBLEMLOG_PK	CASCADE
2	Primary_Key	PROBLEMALLOCATIONLOG_PK	(null)	(null)	(null)
3	Check	SYS_C0023343	"PROBLEMLOGNO" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023344	"FIRSTALLOCATEDSTAFFID" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023345	"SECONDALLOCATEDSTAFFID" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023346	"PROBLEMALLOCATEDBY" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023347	"PROBLEMSTATUS" IS NOT NULL	(null)	(null)
8	Check	SYS_C0023348	"PROBLEMALLOCATEDDATE" IS NOT NULL	(null)	(null)
9	Check	SYS_C0023349	"PROBLEMRESOLVEDDETAILS" IS NOT NULL	(null)	(null)
10	Check	SYS_C0023350	"THIRDALLOCATEDSTAFF" IS NOT NULL	(null)	(null)
11	Check	SYS_C0023351	"PROBLEMALLOCATIONNO" IS NOT NULL	(null)	(null)

CALL Table with comments

COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1 CALLNO	CHAR(6 BYTE)	No	A primary key to represent a call
2 CallDateTime	TIMESTAMP(1) WI...	No	Time of the incoming call
3 CALLDURATION	NUMBER(3,0)	No	Call duration in minutes
4 CALLDETAILS	VARCHAR2(50 BYTE)	No	Details of a call
5 FOLLOWUPCALLDETAILS	VARCHAR2(50 BYTE)	No	Details of a follow up call if applicable
6 STAFFID	CHAR(6 BYTE)	No	A foreign key refers to ITstaff(StaffID)

CALL Table Constraints

CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1 Check	CALLDURATIONNOTZERO	CallDuration > 0	(null)	(null)
2 Foreign_Key	CALL_FK	(null)	ITSTAFF_PK	NO ACTION
3 Primary_Key	CALL_PK	(null)	(null)	(null)
4 Check	SYS_C0023243	"CALLNO" IS NOT NULL	(null)	(null)
5 Check	SYS_C0023244	"CallDateTime" IS NOT NULL	(null)	(null)
6 Check	SYS_C0023246	"CALLDURATION" IS NOT NULL	(null)	(null)
7 Check	SYS_C0023247	"CALLDETAILS" IS NOT NULL	(null)	(null)
8 Check	SYS_C0023248	"FOLLOWUPCALLDETAILS" IS NOT NULL	(null)	(null)
9 Check	SYS_C0023249	"STAFFID" IS NOT NULL	(null)	(null)

CALLER Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	CALLERID	CHAR(6 BYTE)	No	A primary key to represent each caller
2	CALLERFIRSTNAME	VARCHAR2(20 BYTE)	No	Caller's first name
3	CALLERLASTNAME	VARCHAR2(20 BYTE)	No	Caller's last name
4	CALLERJOBTITLE	VARCHAR2(20 BYTE)	No	Job title of the caller
5	CALLERDEPARTMENT	VARCHAR2(10 BYTE)	No	Department of the caller
6	PROBLEMLOGNO	CHAR(10 BYTE)	No	A foreign key refers to ProblemLog(ProblemLogNo)
7	COMPANYEQUIPMENTNO	CHAR(10 BYTE)	Yes	A foreign key that refers to CompanyEquipment(CompanyEquipmentNo)

CALLER Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Foreign_Key	CALLER_FK1	(null)	COMPANYEQUIPMENT_PK	CASCADE
2	Foreign_Key	CALLER_FK2	(null)	PROBLEMLOG_PK	CASCADE
3	Primary_Key	CALLER_PK	(null)	(null)	(null)
4	Check	SYS_C0023235	"CALLERID" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023236	"CALLERFIRSTNAME" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023237	"CALLERLASTNAME" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023238	"CALLERJOBTITLE" IS NOT NULL	(null)	(null)
8	Check	SYS_C0023239	"CALLERDEPARTMENT" IS NOT NULL	(null)	(null)
9	Check	SYS_C0023241	"PROBLEMLOGNO" IS NOT NULL	(null)	(null)

COMPANYEQUIPMENT Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	COMPANYEQUIPMENTNO	CHAR(10 BYTE)	No	A primary key to keep a record of companies and equipments
2	CALLERCOMPANY	VARCHAR2(10 BYTE)	No	(null)
3	EQUIPMENTNO	CHAR(6 BYTE)	No	(null)

COMPANYEQUIPMENT Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Foreign_Key	COMPANYEQUIPMENT_FK1	(null)	HARDWAREEQUIPMENT_PK	CASCADE
2	Primary_Key	COMPANYEQUIPMENT_PK	(null)	(null)	(null)
3	Check	SYS_C0023335	"COMPANYEQUIPMENTNO" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023336	"CALLERCOMPANY" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023337	"EQUIPMENTNO" IS NOT NULL	(null)	(null)

HARDWAREEQUIPMENT Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	EQUIPMENTNO	CHAR(6 BYTE)	No	Equipment number for each device and application. A primary key
2	EQUIPMENTTYPE	VARCHAR2(20 BYTE)	No	Type of equipment including hardware and software
3	EQUIPMENTMAKE	CHAR(5 BYTE)	No	Make of equipment
4	OSLICENCENO	CHAR(6 BYTE)	No	A Foreign key refers to OperatingSystems(OSLicenceNo)
5	SOFTWARELICENCENO	CHAR(6 BYTE)	No	A Foreign key refers to Software(SoftwareLicenceNo)
6	EQUIPMENTDESCRIPTION	VARCHAR2(50 BYTE)	No	Description of each device

HARDWAREEQUIPMENT Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Primary_Key	HARDWAREEQUIPMENT_PK	(null)	(null)	(null)
2	Foreign_Key	OPERATINGSYSTEMS_FK	(null)	OPERATINGSYSTEMS_PK	CASCADE
3	Foreign_Key	SOFTWARE_FK	(null)	SOFTWARE_PK	CASCADE
4	Check	SYS_C0023208	"EQUIPMENTNO" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023209	"EQUIPMENTTYPE" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023210	"EQUIPMENTMAKE" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023211	"OSLICENCENO" IS NOT NULL	(null)	(null)
8	Check	SYS_C0023212	"SOFTWARELICENCENO" IS NOT NULL	(null)	(null)
9	Check	SYS_C0023213	"EQUIPMENTDESCRIPTION" IS NOT NULL	(null)	(null)
10	Unique	UNIQUE_EQUIPMENTDESCRIPTION	(null)	(null)	(null)

ITSTAFF Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	STAFFID	CHAR(6 BYTE)	No	A primary key for Staff ID
2	STAFFFIRSTNAME	VARCHAR2(20 BYTE)	No	First name of a staff
3	STAFFLASTNAME	VARCHAR2(20 BYTE)	No	Last name of a staff
4	JOBTITLE	VARCHAR2(20 BYTE)	No	Job Title
5	CURRENTWORKINGJOBS	NUMBER(3,0)	No	Number of current working jobs
6	SKILLFIELDID	CHAR(6 BYTE)	No	A foreign key refer to Sillfield.SkillFieldID

ITSTAFF Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Check	CURRENTJOBSPOSITIVE	CurrentWorkingJobs >= 0	(null)	(null)
2	Foreign_Key	FK_SKILLFIELD	(null)	SKILLFIELD_PK	NO ACTION
3	Primary_Key	ITSTAFF_PK	(null)	(null)	(null)
4	Check	SYS_C0023225	"STAFFID" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023226	"STAFFFIRSTNAME" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023227	"STAFFLASTNAME" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023228	"JOBTITLE" IS NOT NULL	(null)	(null)
8	Check	SYS_C0023229	"CURRENTWORKINGJOBS" IS NOT NULL	(null)	(null)
9	Check	SYS_C0023230	"SKILLFIELDID" IS NOT NULL	(null)	(null)

OPERATINGSYSTEMS Table

	COLUMN_NAME	DATA_TYPE	NULLABLE
1	OSLICENCENO	CHAR(6 BYTE)	No
2	OSNAME	VARCHAR2(20 BYTE)	No
3	OSLICENSESTARTDATE	DATE	No
4	OSLICENSEEXPIRYDATE	DATE	No

OPERATINGSYSTEMS Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Primary_Key	OPERATINGSYSTEMS_PK	(null)	(null)	(null)
2	Check	SYS_C0023195	"OSNAME" IS NOT NULL	(null)	(null)
3	Check	SYS_C0023206	"OSLICENSESTARTDATE" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023207	"OSLICENSEEXPIRYDATE" IS NOT NULL	(null)	(null)
5	Unique	UNIQUE_OPERATINGSYSTEMS	(null)	(null)	(null)

PROBLEMDESCRIPTION Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	PROBLEMNO	CHAR(6 BYTE)	No	A primary key for probel description
2	PROBLEMDESCRIPTION	VARCHAR2(100 BYTE)	No	A brief summary of the problem
3	PROBLEMSOLUTION	VARCHAR2(100 BYTE)	No	A brief summary of how to solve the problem

PROBLEMDESCRIPTION Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Primary_Key	PROBLEMDESCRIPTION_PK	(null)	(null)	(null)
2	Unique	PROBLEMDESCRIPTION_UNIQUE	(null)	(null)	(null)
3	Check	SYS_C0023252	"PROBLEMNO" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023254	"PROBLEMDESCRIPTION" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023255	"PROBLEMSOLUTION" IS NOT NULL	(null)	(null)

PROBLEMLOG Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	PROBLEMLOGNO	CHAR(10 BYTE)	No	A primary key for logging a problem. Multiple logs could refer to one problem.
2	CALLNO	CHAR(6 BYTE)	No	A foreign key that refers to Call(CallNO)
3	EQUIPMENTNO	CHAR(6 BYTE)	No	A foreign key that refers to HardwareEquipment(EquipmentNo)
4	PROBLEMNO	CHAR(6 BYTE)	No	A foreign key that refers to ProblemDescription(ProblemNo)

PROBLEMDESCRIPTION Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Foreign_Key	PROBLEMLOG_FK1	(null)	HARDWAREEQUIPMENT_PK	CASCADE
2	Foreign_Key	PROBLEMLOG_FK2	(null)	CALL_PK	CASCADE
3	Foreign_Key	PROBLEMLOG_FK3	(null)	PROBLEMDESCRIPTION_PK	CASCADE
4	Primary_Key	PROBLEMLOG_PK	(null)	(null)	(null)
5	Check	SYS_C0023272	"PROBLEMLOGNO" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023274	"CALLNO" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023275	"EQUIPMENTNO" IS NOT NULL	(null)	(null)
8	Check	SYS_C0023276	"PROBLEMNO" IS NOT NULL	(null)	(null)

SKILLFIELD Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	SKILLFIELDID	CHAR(6 BYTE)	No	A primary key for SkillField table
2	SKILLFIELDTYPE	CHAR(4 BYTE)	No	Types of skills like OS for Operating System, HW for Hardware and
3	SKILLFIELDDESCRIPTION	VARCHAR2(50 BYTE)	No	Description for skills. By default is general skills.
4	NOSPECIALIST	NUMBER(2,0)	No	Number of Specialists

SKILLFIELD Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Primary_Key	SKILLFIELD_PK	(null)	(null)	(null)
2	Check	SPECIALISTNOPOSITIVE	NoSpecialist >= 0	(null)	(null)
3	Check	SYS_C0023217	"SKILLFIELDID" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023218	"SKILLFIELDTYPE" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023219	"SKILLFIELDDESCRIPTION" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023220	"NOSPECIALIST" IS NOT NULL	(null)	(null)
7	Unique	UNIQUE_SKILLFIELDTYPE	(null)	(null)	(null)

SOFTWARE Table with comments

	COLUMN_NAME	DATA_TYPE	NULLABLE	COMMENTS
1	SOFTWARELICENCENO	CHAR(6 BYTE)	No	Software Licence Number
2	SOFTWARETYPE	VARCHAR2(20 BYTE)	No	Software Type including application, programming or a driver
3	SOFTWARENAME	VARCHAR2(20 BYTE)	No	Name of software
4	SOFTWAREINSTALLATIONDATE	DATE	No	Installation/starting date of software licence
5	SOFTWAREEXPIRYDATE	DATE	No	Expiry date of a software
6	OSLICENSENO	CHAR(6 BYTE)	No	Foreign key refers to OperatingSystem

SOFTWARE Table Constraints

	CONSTRAINT_TYPE	CONSTRAINT_NAME	SEARCH_CONDITION	R_CONSTRAINT_NAME	DELETE_RULE
1	Foreign_Key	OPERATINGSYSTEM_FK	(null)	OPERATINGSYSTEMS_PK	CASCADE
2	Primary_Key	SOFTWARE_PK	(null)	(null)	(null)
3	Check	SYS_C0023199	"SOFTWARETYPE" IS NOT NULL	(null)	(null)
4	Check	SYS_C0023200	"SOFTWARENAME" IS NOT NULL	(null)	(null)
5	Check	SYS_C0023201	"SOFTWAREINSTALLATIONDATE" IS NOT NULL	(null)	(null)
6	Check	SYS_C0023202	"SOFTWAREEXPIRYDATE" IS NOT NULL	(null)	(null)
7	Check	SYS_C0023203	"OSLICENSENO" IS NOT NULL	(null)	(null)
8	Unique	UNIQUE_SOFTWARE	(null)	(null)	(null)

Assumptions:

1. Each caller works only works for one company.
2. Only registered caller's problems will be logged.
3. There are 5-10 records were used to test SQL for queries in task 3 and 4.
4. Each problem log will deal with a single problem for each equipment
5. Many hardware equipment could have many problems so PROBLEMLOG is used to normalise the many-many relationship between two entities.
6. Many calls could deal with many problems so PROBLEMLOG is used to normalise the many-many relationship between two entities.
7. Each equipment must have at least one operating system or more and could run one or more software
8. For each equipment, there could be multiple problem logs to address multiple problems
9. There will be maximum three members of staff assigned to solve a given problem log one after another and log allocation details will be stored in AllocationResolveLog table.
10. EquipmentNo field will be used to access operating system and software licencing details.