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БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ  
ИНФОРМАТИКИ И РАДИОЭЛЕКТРОНИКИ

Факультет компьютерных систем и сетей

Кафедра программного обеспечения информационных технологий

**ОТЧЕТ**  
по лабораторной работе № 7

по теме:  
Улучшение модели базы данных, часть 2

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## Хранимые подпрограммы:

- Для получения общего количества построенной техники можно создать функцию, которая подсчитает общее количество произведенной техники всех типов.

```
CREATE FUNCTION GET_EQUIPMENT_AMOUNT()  
RETURNS INTEGER DETERMINISTIC  
BEGIN  
    RETURN (SELECT SUM(e_number_build) FROM equipment);  
END;
```

- Для получения общего количества уцелевшей техники за определенный промежуток можно создать функцию, которая подсчитает, сколько уцелевшей техники было произведено за введенный промежуток.

```
CREATE FUNCTION GET_EQUIPMENT_COUNT_IN_TIME_PERIOD(start_date DATE,  
end_date DATE)  
RETURNS INTEGER DETERMINISTIC  
BEGIN  
    RETURN (SELECT COUNT(*) FROM equipment_copy  
    WHERE ec_production_date BETWEEN start_date AND end_date);  
END;
```

- Для получения общего количества техники с указанным типом в базе данных можно создать функцию, которая подсчитает, сколько техники определенного типа содержится в базе данных.

```
CREATE FUNCTION GET_EQUIPMENT_TYPE_AMOUNT(IN type_name VARCHAR(75))  
RETURNS INTEGER DETERMINISTIC  
BEGIN  
    RETURN (SELECT COUNT(*) FROM equipment WHERE e_type = type_name);  
END;
```

- Для получения количества уцелевшей техники с указанным именем в базе данных можно создать функцию, которая подсчитает, сколько уцелевшей техники указанного имени содержится в базе данных.

```
CREATE FUNCTION GET_REMAIN_EQUIPMENT_AMOUNT(equipment_name  
VARCHAR(100))  
RETURNS INTEGER DETERMINISTIC  
BEGIN  
    DECLARE equipment_id INTEGER;  
  
    SELECT e_id INTO equipment_id FROM equipment  
    WHERE e_name = equipment_name;  
  
    IF (equipment_id IS NOT NULL) THEN  
        RETURN (SELECT SUM(l_amount_of_equipment) FROM location  
        WHERE l_equipment = equipment_id);  
    ELSE  
        RETURN -1;  
    END IF;  
  
END;
```

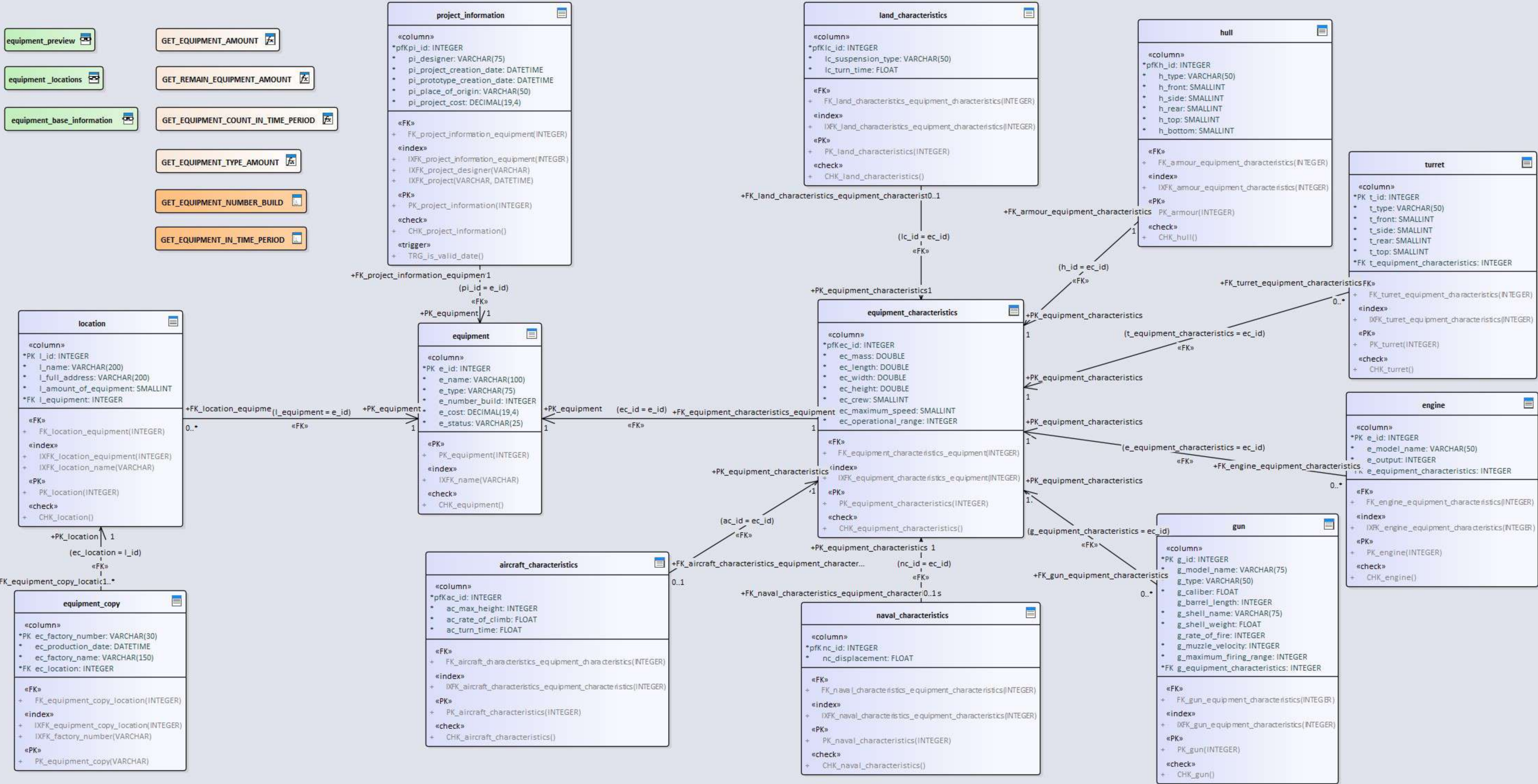
- Для получения информации о созданной технике за определенный период, можно создать процедуру, которая выводит информацию о всей технике, разработанной в данный период времени.

```
CREATE PROCEDURE GET_EQUIPMENT_IN_TIME_PERIOD(IN start_date DATE, IN
end_date DATE)
BEGIN
    SELECT * FROM equipment LEFT JOIN project_information
    ON project_information.pi_id = equipment.e_id
    WHERE pi_project_creation_date BETWEEN start_date AND end_date;
END;
```

- Для получения информации о технике, выпущенной в заданном количестве, можно создать процедуру, которая выводит информацию о технике, выпущенной в количестве равным заданному диапазону.

```
CREATE PROCEDURE GET_EQUIPMENT_NUMBER_BUILD(IN amount_start INTEGER,
IN amount_end INTEGER)
BEGIN
    SELECT e_name, e_number_build FROM equipment
    WHERE e_number_build BETWEEN amount_start AND amount_end;
END;
```







## SQL код:

```
SET FOREIGN_KEY_CHECKS=0;
```

```
DROP USER IF EXISTS 'eguest'@'localhost';  
CREATE USER 'eguest'@'localhost' IDENTIFIED BY  
'gyHMcQUfdg9ehSeQVTy2Ve5A37vqXdCeCJxEhsf';
```

```
GRANT SELECT ON 'equipment_copy' TO 'eguest'@'localhost';  
GRANT SELECT ON 'location' TO 'eguest'@'localhost';  
GRANT SELECT ON 'equipment' TO 'eguest'@'localhost';  
GRANT SELECT ON 'project_information' TO 'eguest'@'localhost';  
GRANT SELECT ON 'equipment_characteristics' TO 'eguest'@'localhost';  
GRANT SELECT ON 'aircraft_characteristics' TO 'eguest'@'localhost';  
GRANT SELECT ON 'naval_characteristics' TO 'eguest'@'localhost';  
GRANT SELECT ON 'land_characteristics' TO 'eguest'@'localhost';  
GRANT SELECT ON 'hull' TO 'eguest'@'localhost';  
GRANT SELECT ON 'turret' TO 'eguest'@'localhost';  
GRANT SELECT ON 'engine' TO 'eguest'@'localhost';  
GRANT SELECT ON 'gun' TO 'eguest'@'localhost';
```

```
DROP USER IF EXISTS 'emoderator'@'localhost';  
CREATE USER 'emoderator'@'localhost' IDENTIFIED BY  
'myHMcQUteyg9ehSeQVTy2Ve5A37vqXdCeCJxEh9v';
```

```
GRANT SELECT,INSERT,UPDATE ON 'equipment_copy' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'location' TO 'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'equipment' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'project_information' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'equipment_characteristics' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'aircraft_characteristics' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'naval_characteristics' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'land_characteristics' TO  
'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'hull' TO 'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'turret' TO 'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'engine' TO 'emoderator'@'localhost';  
GRANT SELECT,INSERT,UPDATE ON 'gun' TO 'emoderator'@'localhost';
```

```
DROP USER IF EXISTS 'eadmin'@'localhost';  
CREATE USER 'eadmin'@'localhost' IDENTIFIED BY  
'ghBNcQRteyg9ehSeQVTy2Vg6y37vqXdCeCJxEj2e';
```

```
GRANT ALL PRIVILEGES ON * TO 'eadmin'@'localhost';
```

```
/* Drop Views */
```

```
DROP VIEW IF EXISTS `equipment_locations` CASCADE  
;
```

```
DROP VIEW IF EXISTS `equipment_base_information` CASCADE  
;
```

```
DROP VIEW IF EXISTS `equipment_preview` CASCADE  
;
```

```
/* Drop Tables */
```

```
DROP TABLE IF EXISTS `aircraft_characteristics` CASCADE  
;
```

```
DROP TABLE IF EXISTS `engine` CASCADE  
;
```

```
DROP TABLE IF EXISTS `equipment` CASCADE  
;
```

```
DROP TABLE IF EXISTS `equipment_characteristics` CASCADE  
;
```

```
DROP TABLE IF EXISTS `equipment_copy` CASCADE  
;
```

```
DROP TABLE IF EXISTS `gun` CASCADE  
;
```

```
DROP TABLE IF EXISTS `hull` CASCADE  
;
```

```
DROP TABLE IF EXISTS `land_characteristics` CASCADE  
;
```

```
DROP TABLE IF EXISTS `location` CASCADE
```

;

DROP TABLE IF EXISTS `naval\_characteristics` CASCADE

;

DROP TABLE IF EXISTS `project\_information` CASCADE

;

DROP TABLE IF EXISTS `turret` CASCADE

;

/\* Drop Stored Procedures \*/

DROP PROCEDURE IF EXISTS `GET\_EQUIPMENT\_IN\_TIME\_PERIOD`

;

DROP PROCEDURE IF EXISTS `GET\_EQUIPMENT\_NUMBER\_BUILD`

;

/\* Drop Functions \*/

DROP FUNCTION IF EXISTS `GET\_EQUIPMENT\_AMOUNT`

;

DROP FUNCTION IF EXISTS  
`GET\_EQUIPMENT\_COUNT\_IN\_TIME\_PERIOD`

;

DROP FUNCTION IF EXISTS `GET\_EQUIPMENT\_TYPE\_AMOUNT`

;

DROP FUNCTION IF EXISTS `GET\_REMAIN\_EQUIPMENT\_AMOUNT`

;

/\* Create Functions \*/

DELIMITER //

CREATE FUNCTION GET\_EQUIPMENT\_AMOUNT()

RETURNS INTEGER DETERMINISTIC

BEGIN

    RETURN (SELECT SUM(e\_number\_build) FROM equipment);

END;

//

DELIMITER ;

;

```
DELIMITER //
CREATE FUNCTION
GET_EQUIPMENT_COUNT_IN_TIME_PERIOD(start_date DATE, end_date
DATE)
RETURNS INTEGER DETERMINISTIC
BEGIN
    RETURN (SELECT COUNT(*) FROM equipment_copy
    WHERE ec_production_date BETWEEN start_date AND end_date);
END;
//
DELIMITER ;
```

;

```
DELIMITER //
CREATE FUNCTION GET_EQUIPMENT_TYPE_AMOUNT(IN type_name
VARCHAR(75))
RETURNS INTEGER DETERMINISTIC
BEGIN
    RETURN (SELECT COUNT(*) FROM equipment      WHERE e_type =
type_name);
END;
//
DELIMITER ;
```

;

```
DELIMITER //
CREATE FUNCTION
GET_REMAIN_EQUIPMENT_AMOUNT(equipment_name VARCHAR(100))
RETURNS INTEGER DETERMINISTIC
BEGIN
    DECLARE equipment_id INTEGER;

    SELECT e_id INTO equipment_id FROM equipment
    WHERE e_name = equipment_name;

    IF (equipment_id IS NOT NULL) THEN
        RETURN (SELECT SUM(l_amount_of_equipment) FROM location
        WHERE l_equipment = equipment_id);
    ELSE
        RETURN -1;
    END IF;
```



```

END;
//
DELIMITER ;

;

/* Create Tables */

CREATE TABLE `aircraft_characteristics`
(
    `ac_id` INT NOT NULL,
    `ac_max_height` INT NOT NULL,
    `ac_rate_of_climb` FLOAT(0,0) NOT NULL,
    `ac_turn_time` FLOAT(0,0) NOT NULL,
    CONSTRAINT `PK_aircraft_characteristics` PRIMARY KEY (`ac_id`
ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `engine`
(
    `e_id` INT NOT NULL,
    `e_model_name` VARCHAR(50) NOT NULL,
    `e_output` INT NOT NULL,
    `e_equipment_characteristics` INT NOT NULL,
    CONSTRAINT `PK_engine` PRIMARY KEY (`e_id` ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `equipment`
(
    `e_id` INT NOT NULL,
    `e_name` VARCHAR(100) NOT NULL,
    `e_type` VARCHAR(75) NOT NULL,
    `e_number_build` INT NOT NULL,
    `e_cost` DECIMAL(19,4) NOT NULL,
    `e_status` VARCHAR(25) NOT NULL,
    CONSTRAINT `PK_equipment` PRIMARY KEY (`e_id` ASC)
)

```

```
)  
ENGINE=InnoDB  
COLLATE utf8_general_ci  
DEFAULT CHARACTER SET utf  
;
```

```
CREATE TABLE `equipment_characteristics`  
(  
    `ec_id` INT NOT NULL,  
    `ec_mass` DOUBLE(0,0) NOT NULL,  
    `ec_length` DOUBLE(0,0) NOT NULL,  
    `ec_width` DOUBLE(0,0) NOT NULL,  
    `ec_height` DOUBLE(0,0) NOT NULL,  
    `ec_crew` SMALLINT NOT NULL,  
    `ec_maximum_speed` SMALLINT NOT NULL,  
    `ec_operational_range` INT NOT NULL,  
    CONSTRAINT `PK_equipment_characteristics` PRIMARY KEY (`ec_id`  
ASC)  
)  
ENGINE=InnoDB  
COLLATE utf8_general_ci  
DEFAULT CHARACTER SET utf  
;
```

```
CREATE TABLE `equipment_copy`  
(  
    `ec_factory_number` VARCHAR(30) NOT NULL,  
    `ec_production_date` DATETIME NOT NULL,  
    `ec_factory_name` VARCHAR(150) NOT NULL,  
    `ec_location` INT NOT NULL,  
    CONSTRAINT `PK_equipment_copy` PRIMARY KEY  
(`ec_factory_number` ASC)  
)  
ENGINE=InnoDB  
COLLATE utf8_general_ci  
DEFAULT CHARACTER SET utf  
;
```

```
CREATE TABLE `gun`  
(  
    `g_id` INT NOT NULL,  
    `g_model_name` VARCHAR(75) NOT NULL,  
    `g_type` VARCHAR(50) NOT NULL,  
    `g_caliber` FLOAT(0,0) NOT NULL,  
    `g_barrel_length` INT NOT NULL,
```

```

        `g_shell_name` VARCHAR(75) NOT NULL,
        `g_shell_weight` FLOAT(0,0) NOT NULL,
        `g_rate_of_fire` INT NULL,
        `g_muzzle_velocity` INT NOT NULL,
        `g_maximum_firing_range` INT NOT NULL,
        `g_equipment_characteristics` INT NOT NULL,
        CONSTRAINT `PK_gun` PRIMARY KEY (`g_id` ASC)
    )
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `hull`
(
    `h_id` INT NOT NULL,
    `h_type` VARCHAR(50) NOT NULL,
    `h_front` SMALLINT NOT NULL,
    `h_side` SMALLINT NOT NULL,
    `h_rear` SMALLINT NOT NULL,
    `h_top` SMALLINT NOT NULL,
    `h_bottom` SMALLINT NOT NULL,
    CONSTRAINT `PK_armour` PRIMARY KEY (`h_id` ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `land_characteristics`
(
    `lc_id` INT NOT NULL,
    `lc_suspension_type` VARCHAR(50) NOT NULL,
    `lc_turn_time` FLOAT(0,0) NOT NULL,
    CONSTRAINT `PK_land_characteristics` PRIMARY KEY (`lc_id` ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `location`
(
    `l_id` INT NOT NULL,
    `l_name` VARCHAR(200) NOT NULL,

```

```

        `l_full_address` VARCHAR(200) NOT NULL,
        `l_amount_of_equipment` SMALLINT NOT NULL,
        `l_equipment` INT NOT NULL,
        CONSTRAINT `PK_location` PRIMARY KEY (`l_id` ASC)
    )
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `naval_characteristics`
(
    `nc_id` INT NOT NULL,
    `nc_displacement` FLOAT(0,0) NOT NULL,
    CONSTRAINT `PK_naval_characteristics` PRIMARY KEY (`nc_id` ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `project_information`
(
    `pi_id` INT NOT NULL,
    `pi_designer` VARCHAR(75) NOT NULL,
    `pi_project_creation_date` DATETIME NOT NULL,
    `pi_prototype_creation_date` DATETIME NOT NULL,
    `pi_place_of_origin` VARCHAR(50) NOT NULL,
    `pi_project_cost` DECIMAL(19,4) NOT NULL,
    CONSTRAINT `PK_project_information` PRIMARY KEY (`pi_id` ASC)
)
ENGINE=InnoDB
COLLATE utf8_general_ci
DEFAULT CHARACTER SET utf
;

CREATE TABLE `turret`
(
    `t_id` INT NOT NULL,
    `t_type` VARCHAR(50) NOT NULL,
    `t_front` SMALLINT NOT NULL,
    `t_side` SMALLINT NOT NULL,
    `t_rear` SMALLINT NOT NULL,
    `t_top` SMALLINT NOT NULL,
    `t_equipment_characteristics` INT NOT NULL,

```

```

        CONSTRAINT `PK_turret` PRIMARY KEY (`t_id` ASC)
    )
    ENGINE=InnoDB
    COLLATE utf8_general_ci
    DEFAULT CHARACTER SET utf
;

/* Create Primary Keys, Indexes, Uniques, Checks */

ALTER TABLE `aircraft_characteristics`
    ADD CONSTRAINT `CHK_aircraft_characteristics` CHECK ('ac_max_height' >
0 and 'ac_rate_of_climb' > 0 and 'ac_turn_time' > 0 and
WHERE NOT EXISTS (SELECT * FROM naval_characteristics
WHERE naval_characteristics.nc_id = aircraft_characteristics.ac_id) and
WHERE NOT EXISTS (SELECT * FROM land_characteristics
WHERE land_characteristics.lc_id = aircraft_characteristics.ac_id))
;

ALTER TABLE `aircraft_characteristics`
    ADD INDEX `IXFK_aircraft_characteristics_equipment_characteristics` (`ac_id`
ASC)
;

ALTER TABLE `engine`
    ADD CONSTRAINT `CHK_engine` CHECK ('e_output' > 0)
;

ALTER TABLE `engine`
    ADD INDEX `IXFK_engine_equipment_characteristics`
(`e_equipment_characteristics` ASC)
;

ALTER TABLE `equipment`
    ADD CONSTRAINT `CHK_equipment` CHECK ('e_cost' > 0 and
('e_status' = 'Стоит на вооружении' or 'e_status' = 'Снята с вооружения'))
;

ALTER TABLE `equipment`
    ADD INDEX `IXFK_name` (`e_name` ASC)
;

ALTER TABLE `equipment_characteristics`
    ADD CONSTRAINT `CHK_equipment_characteristics` CHECK ('ec_mass' > 0
and 'ec_length' > 0 and 'ec_width' > 0 and 'ec_height' > 0
and 'ec_crew' > 0 and 'ec_maximum_speed' > 0 and 'ec_operational_range' > 0)

```

;

```
ALTER TABLE `equipment_characteristics`  
  ADD INDEX `IXFK_equipment_characteristics_equipment` (`ec_id` ASC)  
;
```

```
ALTER TABLE `equipment_copy`  
  ADD INDEX `IXFK_equipment_copy_location` (`ec_location` ASC)  
;
```

```
ALTER TABLE `equipment_copy`  
  ADD INDEX `IXFK_factory_number` (`ec_factory_number` ASC)  
;
```

```
ALTER TABLE `gun`  
  ADD CONSTRAINT `CHK_gun` CHECK ('g_caliber' > 0 and 'g_shell_weight' >  
0 and 'g_muzzle_velocity' > 0  
and 'g_maximum_firing_range' > 0)  
;
```

```
ALTER TABLE `gun`  
  ADD INDEX `IXFK_gun_equipment_characteristics`  
(`g_equipment_characteristics` ASC)  
;
```

```
ALTER TABLE `hull`  
  ADD CONSTRAINT `CHK_hull` CHECK ('h_front' > 0 and 'h_side' > 0 and  
'h_rear' > 0 and 'h_top' >= 0 and  
'h_bottom' >= 0)  
;
```

```
ALTER TABLE `hull`  
  ADD INDEX `IXFK_armour_equipment_characteristics` (`h_id` ASC)  
;
```

```
ALTER TABLE `land_characteristics`  
  ADD CONSTRAINT `CHK_land_characteristics` CHECK ('lc_turn_time' > 0  
and  
WHERE NOT EXISTS (SELECT * FROM aircraft_characteristics  
WHERE aircraft_characteristics.ac_id = land_characteristics.lc_id) and  
WHERE NOT EXISTS (SELECT * FROM naval_characteristics  
WHERE naval_characteristics.nc_id = land_characteristics.lc_id))  
;
```

```
ALTER TABLE `land_characteristics`
```



```
ADD INDEX `IXFK_land_characteristics_equipment_characteristics` (`lc_id`  
ASC)  
;
```

```
ALTER TABLE `location`  
ADD CONSTRAINT `CHK_location` CHECK ('l_amount_of_equipment' > 0)  
;
```

```
ALTER TABLE `location`  
ADD INDEX `IXFK_location_equipment` (`l_equipment` ASC)  
;
```

```
ALTER TABLE `location`  
ADD INDEX `IXFK_location_name` (`l_name` ASC)  
;
```

```
ALTER TABLE `naval_characteristics`  
ADD CONSTRAINT `CHK_naval_characteristics` CHECK ('nc_displacement' >  
0 and  
WHERE NOT EXISTS (SELECT * FROM land_characteristics  
WHERE land_characteristics.lc_id = naval_characteristics.nc_id) and  
WHERE NOT EXISTS (SELECT * FROM aircraft_characteristics  
WHERE aircraft_characteristics.ac_id = naval_characteristics.nc_id))  
;
```

```
ALTER TABLE `naval_characteristics`  
ADD INDEX `IXFK_naval_characteristics_equipment_characteristics` (`nc_id`  
ASC)  
;
```

```
ALTER TABLE `project_information`  
ADD CONSTRAINT `CHK_project_information` CHECK ('pi_project_cost' > 0)  
;
```

```
ALTER TABLE `project_information`  
ADD INDEX `IXFK_project_information_equipment` (`pi_id` ASC)  
;
```

```
ALTER TABLE `project_information`  
ADD INDEX `IXFK_project_designer` (`pi_designer` ASC)  
;
```

```
ALTER TABLE `project_information`  
ADD INDEX `IXFK_project` (`pi_designer` ASC, `pi_project_creation_date`  
ASC)
```

;

DELIMITER //

CREATE TRIGGER 'TRG\_is\_valid\_date' BEFORE INSERT

ON project\_information FOR EACH ROW

BEGIN

IF(NEW.pi\_project\_creation\_date > '01.07.1939' and

NEW.pi\_project\_creation\_date < '02.07.1945') THEN

SIGNAL SQLSTATE '45000' SET MESSAGE\_TEXT =

'Project creation date must be between 01.07.1939 and 02.07.1945';

END IF;

END;

//

DELIMITER ;

;

ALTER TABLE `turret`

ADD CONSTRAINT `CHK\_turret` CHECK ('t\_front' > 0 and 't\_side' > 0 and  
't\_rear' > 0 and 't\_top' >= 0)

;

ALTER TABLE `turret`

ADD INDEX `IXFK\_turret\_equipment\_characteristics`  
(`t\_equipment\_characteristics` ASC)

;

/\* Create Foreign Key Constraints \*/

ALTER TABLE `aircraft\_characteristics`

ADD CONSTRAINT `FK\_aircraft\_characteristics\_equipment\_characteristics`  
FOREIGN KEY (`ac\_id`) REFERENCES `equipment\_characteristics`  
(`ec\_id`) ON DELETE Cascade ON UPDATE Cascade

;

ALTER TABLE `engine`

ADD CONSTRAINT `FK\_engine\_equipment\_characteristics`  
FOREIGN KEY (`e\_equipment\_characteristics`) REFERENCES  
`equipment\_characteristics` (`ec\_id`) ON DELETE Cascade ON UPDATE  
Cascade

;

ALTER TABLE `equipment\_characteristics`

ADD CONSTRAINT `FK\_equipment\_characteristics\_equipment`  
FOREIGN KEY (`ec\_id`) REFERENCES `equipment` (`e\_id`) ON  
DELETE Cascade ON UPDATE Cascade

;

```
ALTER TABLE `equipment_copy`  
  ADD CONSTRAINT `FK_equipment_copy_location`  
    FOREIGN KEY (`ec_location`) REFERENCES `location` (`l_id`) ON  
DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `gun`  
  ADD CONSTRAINT `FK_gun_equipment_characteristics`  
    FOREIGN KEY (`g_equipment_characteristics`) REFERENCES  
`equipment_characteristics` (`ec_id`) ON DELETE Cascade ON UPDATE  
Cascade
```

;

```
ALTER TABLE `hull`  
  ADD CONSTRAINT `FK_armour_equipment_characteristics`  
    FOREIGN KEY (`h_id`) REFERENCES `equipment_characteristics`  
(`ec_id`) ON DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `land_characteristics`  
  ADD CONSTRAINT `FK_land_characteristics_equipment_characteristics`  
    FOREIGN KEY (`lc_id`) REFERENCES `equipment_characteristics`  
(`ec_id`) ON DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `location`  
  ADD CONSTRAINT `FK_location_equipment`  
    FOREIGN KEY (`l_equipment`) REFERENCES `equipment` (`e_id`) ON  
DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `naval_characteristics`  
  ADD CONSTRAINT `FK_naval_characteristics_equipment_characteristics`  
    FOREIGN KEY (`nc_id`) REFERENCES `equipment_characteristics`  
(`ec_id`) ON DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `project_information`  
  ADD CONSTRAINT `FK_project_information_equipment`  
    FOREIGN KEY (`pi_id`) REFERENCES `equipment` (`e_id`) ON  
DELETE Cascade ON UPDATE Cascade
```

;

```
ALTER TABLE `turret`  
  ADD CONSTRAINT `FK_turret_equipment_characteristics`  
    FOREIGN KEY (`t_equipment_characteristics`) REFERENCES  
`equipment_characteristics` (`ec_id`) ON DELETE Cascade ON UPDATE  
Cascade  
;
```

```
SET FOREIGN_KEY_CHECKS=1  
;  
/* Create Views */
```

```
CREATE VIEW 'equipment_locations' AS  
SELECT  
  equipment.e_name,  
  location.l_name,  
  location.l_full_address,  
  equipment_copy.ec_factory_number  
FROM equipment  
LEFT JOIN location ON location.l_equipment = equipment.e_id  
LEFT JOIN equipment_copy ON equipment_copy.ec_location = location.l_id;  
;
```

```
CREATE VIEW 'equipment_base_information' AS  
SELECT  
  equipment.e_name,  
  equipment.e_type,  
  project_information.pi_place_of_origin,  
  project_information.pi_designer,  
  project_information.pi_project_creation_date,  
  equipment.e_number_build,  
  equipment.e_status,  
  equipment_characteristics.ec_mass,  
  equipment_characteristics.ec_crew,  
  equipment_characteristics.ec_maximum_speed,  
  equipment_characteristics.ec_operational_range,  
  land_characteristics.lc_suspension_type,  
  land_characteristics.lc_turn_time,  
  aircraft_characteristics.ac_max_height,  
  aircraft_characteristics.ac_rate_of_climb,  
  aircraft_characteristics.ac_turn_time,  
  naval_characteristics.nc_displacement,  
  hull.h_type,  
  hull.h_front,  
  hull.h_side,
```

```

hull.h_rear,
turret.t_type,
turret.t_front,
turret.t_side,
turret.t_rear,
engine.e_model_name,
engine.e_output,
gun.g_model_name,
gun.g_type,
gun.g_caliber,
gun.g_rate_of_fire,
gun.g_muzzle_velocity,
gun.g_maximum_firing_range
FROM equipment
LEFT JOIN project_information
ON project_information.pi_id = equipment.e_id
LEFT JOIN equipment_characteristics
ON equipment_characteristics.ec_id = equipment.e_id
LEFT JOIN land_characteristics
ON land_characteristics.lc_id = equipment_characteristics.ec_id
LEFT JOIN aircraft_characteristics
ON aircraft_characteristics.ac_id = equipment_characteristics.ec_id
LEFT JOIN naval_characteristics
ON naval_characteristics.nc_id = equipment_characteristics.ec_id
LEFT JOIN hull ON hull.h_id = equipment_characteristics.ec_id
LEFT JOIN turret
ON turret.t_equipment_characteristics = equipment_characteristics.ec_id
LEFT JOIN engine
ON engine.e_equipment_characteristics = equipment_characteristics.ec_id
LEFT JOIN gun
ON gun.g_equipment_characteristics = equipment_characteristics.ec_id;
;

```

```

CREATE VIEW 'equipment_preview' AS
SELECT
equipment.e_name,
equipment.e_type,
project_information.pi_place_of_origin,
project_information.pi_designer,
project_information.pi_project_creation_date,
equipment.e_number_build,
equipment.e_status
FROM equipment
LEFT JOIN project_information

```

```
ON project_information.pi_id = equipment.e_id;  
;
```

```
/* Create Stored Procedures */
```

```
DELIMITER //  
CREATE PROCEDURE GET_EQUIPMENT_IN_TIME_PERIOD(IN start_date  
DATE, IN end_date DATE)  
BEGIN  
    SELECT * FROM equipment LEFT JOIN project_information  
    ON project_information.pi_id = equipment.e_id  
    WHERE pi_project_creation_date BETWEEN start_date AND end_date;  
END;  
//  
DELIMITER ;
```

```
;
```

```
DELIMITER //  
CREATE PROCEDURE GET_EQUIPMENT_NUMBER_BUILD(IN  
amount_start INTEGER, IN amount_end INTEGER)  
BEGIN  
    SELECT e_name, e_number_build FROM equipment  
    WHERE e_number_build BETWEEN amount_start AND amount_end;  
END;  
//  
DELIMITER ;
```

```
;
```