1. ER
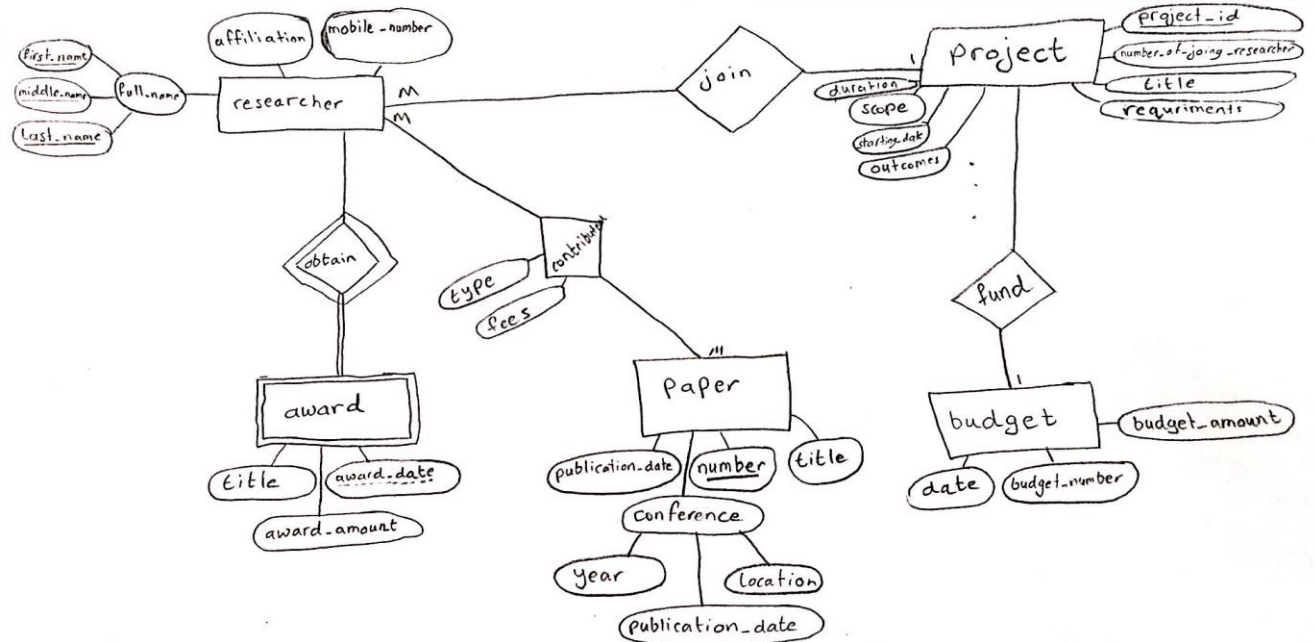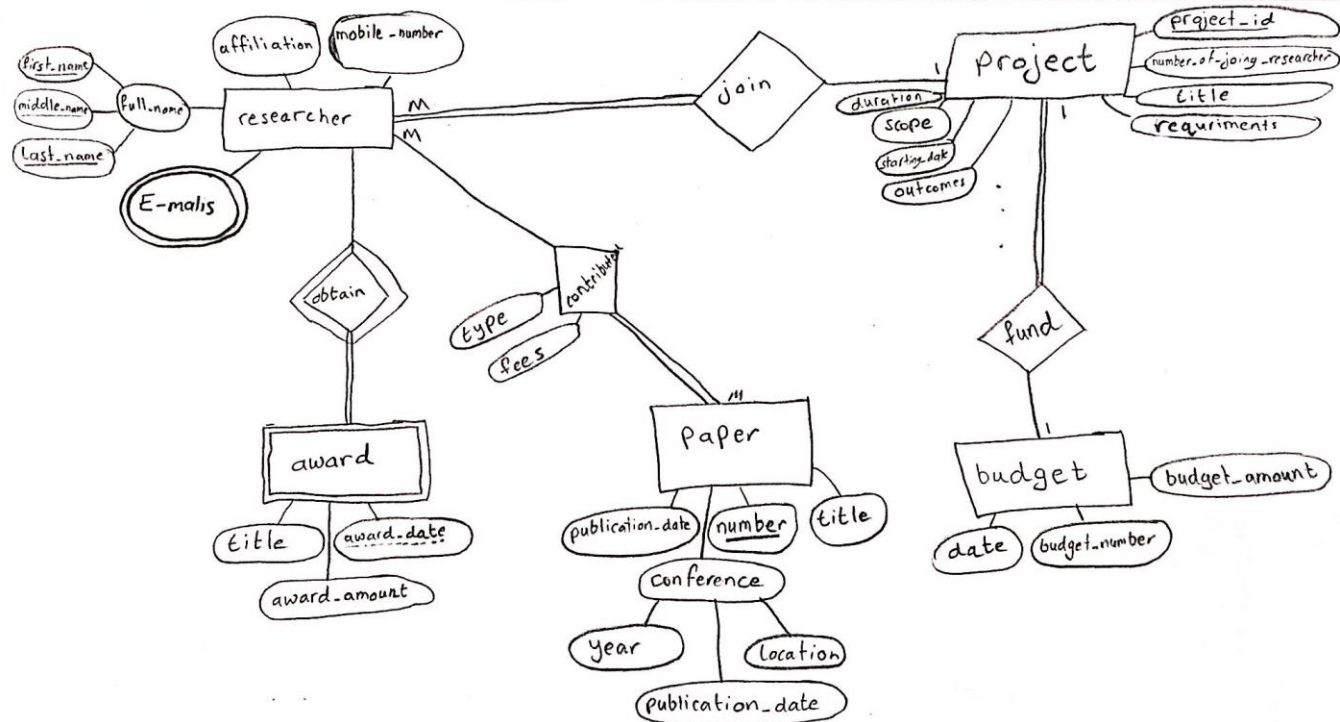
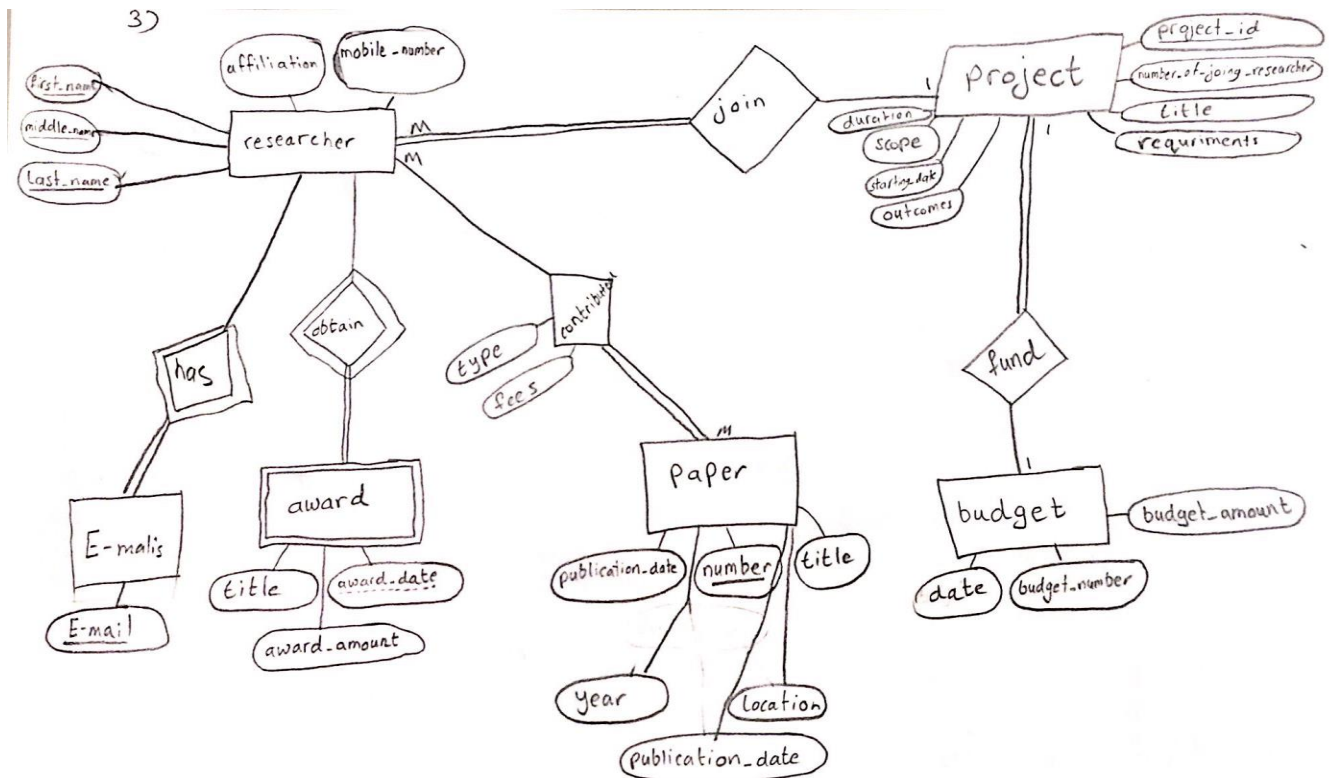## 2. Unspecified requirements and ER refined (If found)
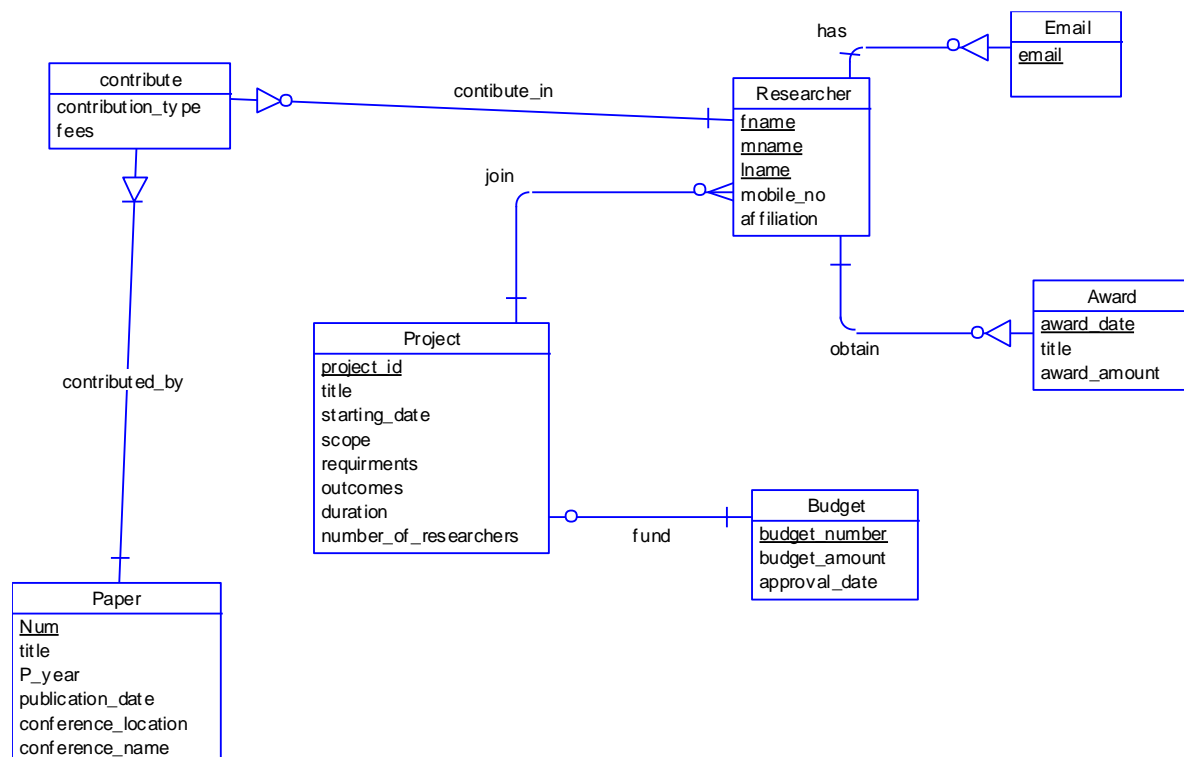
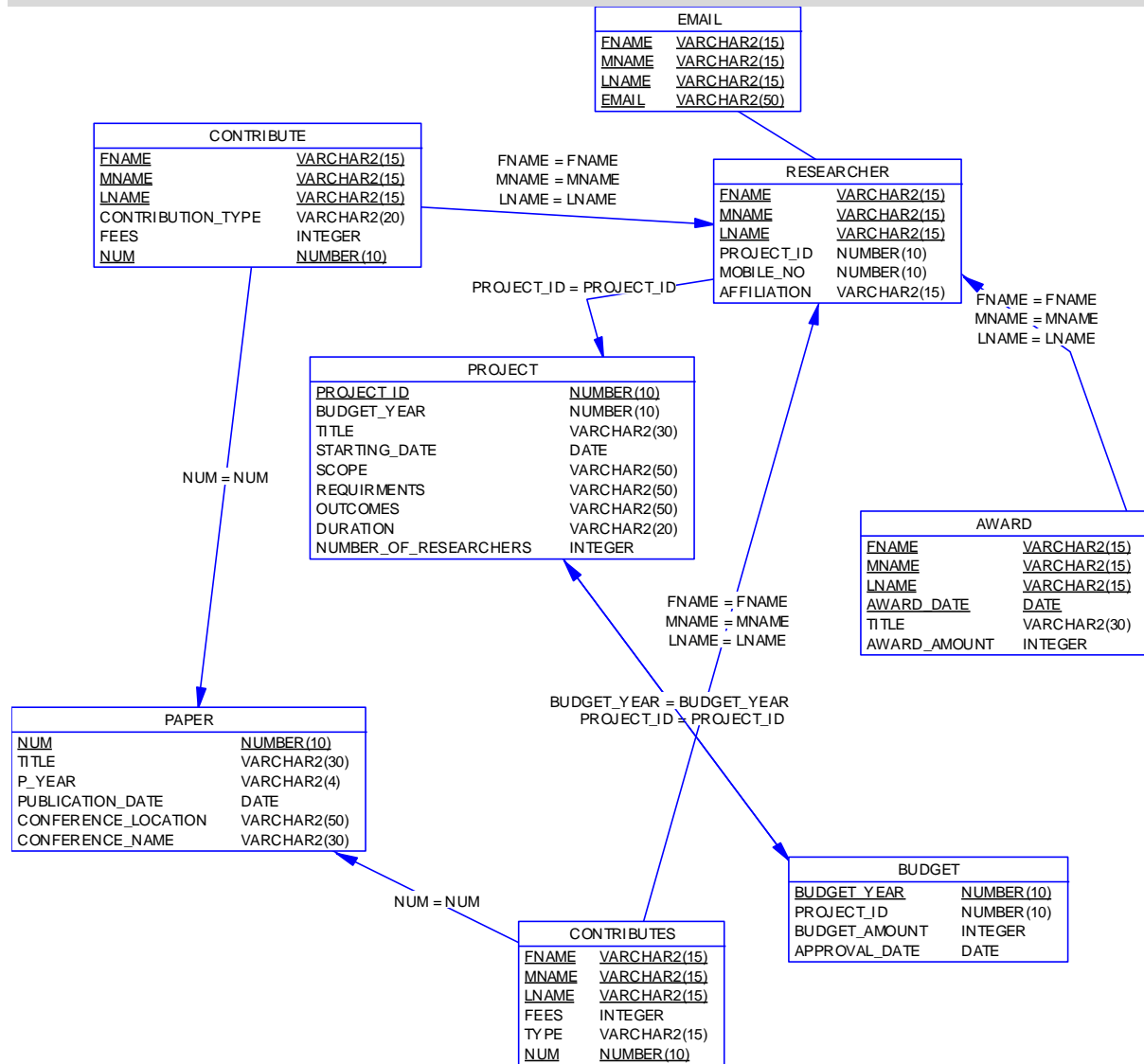## 3. ER modified to overcome DataArchitect limitations:

4. CDM:

5. PDM

EMAIL

FNAME	VARCHAR2(15)
MNAME	VARCHAR2(15)
LNAME	VARCHAR2(15)
EMAIL	VARCHAR2(50)

CONTRIBUTE

FNAME	VARCHAR2(15)
MNAME	VARCHAR2(15)
LNAME	VARCHAR2(15)
CONTRIBUTION_TYPE	VARCHAR2(20)
FEES	INTEGER
NUM	NUMBER(10)

FNAME = FNAME
MNAME = MNAME
LNAME = LNAME

RESEARCHER

FNAME	VARCHAR2(15)
MNAME	VARCHAR2(15)
LNAME	VARCHAR2(15)
PROJECT_ID	NUMBER(10)
MOBILE_NO	NUMBER(10)
AFFILIATION	VARCHAR2(15)

PROJECT_ID = PROJECT_ID

FNAME = FNAME
MNAME = MNAME
LNAME = LNAME

PROJECT

PROJECT_ID	NUMBER(10)
BUDGET_YEAR	NUMBER(10)
TITLE	VARCHAR2(30)
STARTING_DATE	DATE
SCOPE	VARCHAR2(50)
REQUIRMENTS	VARCHAR2(50)
OUTCOMES	VARCHAR2(50)
DURATION	VARCHAR2(20)
NUMBER_OF_RESEARCHERS	INTEGER

AWARD

FNAME	VARCHAR2(15)
MNAME	VARCHAR2(15)
LNAME	VARCHAR2(15)
AWARD_DATE	DATE
TITLE	VARCHAR2(30)
AWARD_AMOUNT	INTEGER

NUM = NUM

FNAME = FNAME
MNAME = MNAME
LNAME = LNAME

PAPER

NUM	NUMBER(10)
TITLE	VARCHAR2(30)
P_YEAR	VARCHAR2(4)
PUBLICATION_DATE	DATE
CONFERENCE_LOCATION	VARCHAR2(50)
CONFERENCE_NAME	VARCHAR2(30)

BUDGET_YEAR = BUDGET_YEAR
PROJECT_ID = PROJECT_ID

BUDGET

BUDGET_YEAR	NUMBER(10)
PROJECT_ID	NUMBER(10)
BUDGET_AMOUNT	INTEGER
APPROVAL_DATE	DATE

NUM = NUM

CONTRIBUTES

FNAME	VARCHAR2(15)
MNAME	VARCHAR2(15)
LNAME	VARCHAR2(15)
FEES	INTEGER
TYPE	VARCHAR2(15)
NUM	NUMBER(10)

6. SQL script to generate the Database:

```
-- ============================================================
-- Database name:  MODEL_1
-- DBMS name:      ORACLE Version 7.x
-- Created on:     11/16/2017  1:50 PM
-- ============================================================


drop table CONTRIBUTE cascade constraints
/

drop table CONTRIBUTES cascade constraints
/

drop table EMAIL cascade constraints
/

drop table AWARD cascade constraints
/

drop table RESEARCHER cascade constraints
/

drop table PROJECT cascade constraints
/

drop table BUDGET cascade constraints
/

drop table PAPER cascade constraints
/


-- ============================================================
-- Table: PAPER
-- ============================================================
create table PAPER
(
   NUM                  NUMBER(10)          not null,
   TITLE                VARCHAR2(30)        null  ,
   P_YEAR               VARCHAR2(4)         null  ,
   PUBLICATION_DATE     DATE                null  ,
   CONFERENCE_LOCATION  VARCHAR2(50)        null  ,
   CONFERENCE_NAME      VARCHAR2(30)        null  ,
   constraint PK_PAPER primary key (NUM)
)
/
```

```
-- ================================================================
--   Table: BUDGET
-- ================================================================
create table BUDGET
(
   BUDGET_YEAR          NUMBER(10)          not null,
   PROJECT_ID         NUMBER(10)         null   ,
   BUDGET_AMOUNT        INTEGER            null   ,
   APPROVAL_DATE        DATE               null   ,
   constraint PK_BUDGET primary key (BUDGET_YEAR)
)
/


-- ================================================================
--   Table: PROJECT
-- ================================================================
create table PROJECT
(
   PROJECT_ID         NUMBER(10)         not null,
   BUDGET_YEAR         NUMBER(10)          not null,
   TITLE            VARCHAR2(30)        not null,
   STARTING_DATE        DATE               null   ,
   SCOPE            VARCHAR2(50)        null   ,
   REQUIRMENTS        VARCHAR2(50)        null   ,
   OUTCOMES          VARCHAR2(50)        null   ,
   DURATION          VARCHAR2(20)        null   ,
   NUMBER_OF_RESEARCHERS  INTEGER            null   ,
   constraint PK_PROJECT primary key (PROJECT_ID)
)
/


-- ================================================================
--   Table: RESEARCHER
-- ================================================================
create table RESEARCHER
(
   FNAME            VARCHAR2(15)        not null,
   MNAME            VARCHAR2(15)         not null,
   LNAME            VARCHAR2(15)        not null,
   PROJECT_ID         NUMBER(10)         not null,
   MOBILE_NO          NUMBER(10)         null   ,
   AFFILIATION        VARCHAR2(15)        null   ,
   constraint PK_RESEARCHER primary key (FNAME, MNAME, LNAME)
)
```

```
/

-- ================================================================
--   Table: AWARD
-- ================================================================
create table AWARD
(
   FNAME            VARCHAR2(15)         not null,
   MNAME            VARCHAR2(15)         not null,
   LNAME            VARCHAR2(15)         not null,
   AWARD_DATE       DATE                 not null,
   TITLE            VARCHAR2(30)      null    ,
   AWARD_AMOUNT     INTEGER              null    ,
   constraint PK_AWARD primary key (FNAME, MNAME, LNAME, AWARD_DATE)
)
/


-- ================================================================
--   Table: EMAIL
-- ================================================================
create table EMAIL
(
   FNAME            VARCHAR2(15)         not null,
   MNAME            VARCHAR2(15)          not null,
   LNAME            VARCHAR2(15)          not null,
   EMAIL            VARCHAR2(50)         not null,
   constraint PK_EMAIL primary key (FNAME, MNAME, LNAME, EMAIL)
)
/


-- ================================================================
--   Table: CONTRIBUTES
-- ================================================================
create table CONTRIBUTES
(
   FNAME            VARCHAR2(15)          not null,
   MNAME            VARCHAR2(15)          not null,
   LNAME            VARCHAR2(15)          not null,
   FEES             INTEGER           null    ,
   TYPE             VARCHAR2(15)         null    ,
   NUM              NUMBER(10)        not null,
   constraint PK_CONTRIBUTES primary key (FNAME, MNAME, LNAME, NUM)
)
/
```

```
-- ============================================================
--  Table: CONTRIBUTE
-- ============================================================
create table CONTRIBUTE
(
   FNAME              VARCHAR2(15)        not null,
   MNAME              VARCHAR2(15)         not null,
   LNAME              VARCHAR2(15)        not null,
   CONTRIBUTION_TYPE    VARCHAR2(20)          null   ,
   FEES               INTEGER              null   ,
   NUM              NUMBER(10)          not null,
   constraint PK_CONTRIBUTE primary key (FNAME, MNAME, LNAME, NUM)
)
/

alter table BUDGET
   add constraint FK_BUDGET_FUND_PROJECT foreign key  (PROJECT_ID)
     references PROJECT (PROJECT_ID)
/

alter table PROJECT
   add constraint FK_PROJECT_FUND2_BUDGET foreign key  (BUDGET_YEAR)
     references BUDGET (BUDGET_YEAR)
/

alter table RESEARCHER
   add constraint FK_RESEARCH_JOIN_PROJECT foreign key  (PROJECT_ID)
     references PROJECT (PROJECT_ID)
/

alter table AWARD
   add constraint FK_AWARD_OBTAIN_RESEARCH foreign key   (FNAME, MNAME,
LNAME)
     references RESEARCHER (FNAME, MNAME, LNAME)
/

alter table EMAIL
   add constraint FK_EMAIL_HAS_RESEARCH foreign key    (FNAME, MNAME,
LNAME)
     references RESEARCHER (FNAME, MNAME, LNAME)
/

alter table CONTRIBUTES
   add constraint FK_CONTRIBU_RELATION__PAPER foreign key (NUM)
     references PAPER (NUM)
```

/

alter table CONTRIBUTES
   add constraint FK_CONTRIBU_RELATION__RESEARCH foreign key (FNAME, MNAME, LNAME)
    references RESEARCHER (FNAME, MNAME, LNAME)
/

alter table CONTRIBUTE
   add constraint FK_CONTRIBU_CONTRIBUT_PAPER foreign key (NUM)
    references PAPER (NUM)
/

alter table CONTRIBUTE
   add constraint FK_CONTRIBU_CONTIBUTE_RESEARCH foreign key (FNAME, MNAME, LNAME)
    references RESEARCHER (FNAME, MNAME, LNAME)
/