Research Higher Degree Logical Model

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Thursdays **Group 4**

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Version 0.1-DRAFT

4/5/2014

Created as part of the requirements for Advanced Database GE 2014

Contents

[1. Derive relations 3](#_Toc387865669)

[1.1. Conceptual E-R diagram 3](#_Toc387865670)

[1.2. Strong Entity types 4](#_Toc387865671)

[1.3. Weak Entity types 4](#_Toc387865672)

[1.4. One-to-many binary relationships 5](#_Toc387865673)

[1.5. One-to-one binary relationships 5](#_Toc387865674)

[1.5.1. Mandatory on both sides 5](#_Toc387865675)

[1.5.2. Mandatory on one side 6](#_Toc387865676)

[1.5.3. Optional on both sides 6](#_Toc387865677)

[1.6. One-to-one recursive relationships 6](#_Toc387865678)

[1.7. Superclass/subclass relationships 6](#_Toc387865679)

[1.8. Many-to-many binary relationship types 6](#_Toc387865680)

[1.8.1. University Staff Member *works in* Research Area 6](#_Toc387865681)

[1.8.2. University Staff Member *oversees* Research Area 7](#_Toc387865682)

[1.8.3. Application *in* Research Area 7](#_Toc387865683)

[1.8.4. University Staff Member *flags* Application 8](#_Toc387865684)

[1.9. Complex relationship types 8](#_Toc387865685)

[1.10. Multi-valued attributes 8](#_Toc387865686)

[1.11. Discussion DELETE THIS 8](#_Toc387865687)

[2. Normalisation 10](#_Toc387865688)

[2.1. Lookup relations 12](#_Toc387865689)

[2.1.1. Lookup relationships 13](#_Toc387865690)

[2.2. Normalised Relations 14](#_Toc387865691)

[2.3. Logical E-R Diagram 16](#_Toc387865692)

[3. User transaction validation 17](#_Toc387865693)

[3.1. Transaction pathways 18](#_Toc387865694)

[4. Check integrity constraints (Sam) 19](#_Toc387865695)

[4.1. Required data 19](#_Toc387865696)

[4.2. Attribute domain constraints 19](#_Toc387865697)

[4.3. Multiplicity 20](#_Toc387865698)

[4.4. Entity integrity 20](#_Toc387865699)

[4.5. Referential integrity 21](#_Toc387865700)

[4.6. General constraints. 21](#_Toc387865701)

[5. Review logical data model () 21](#_Toc387865702)

[6. Check for future growth () 21](#_Toc387865703)

[7. Develop Test Plan 22](#_Toc387865704)

[8. Data dictionary 22](#_Toc387865705)

[9. Conceptual E-R Diagram 22](#_Toc387865706)

[10. Logical E-R Diagram 22](#_Toc387865707)

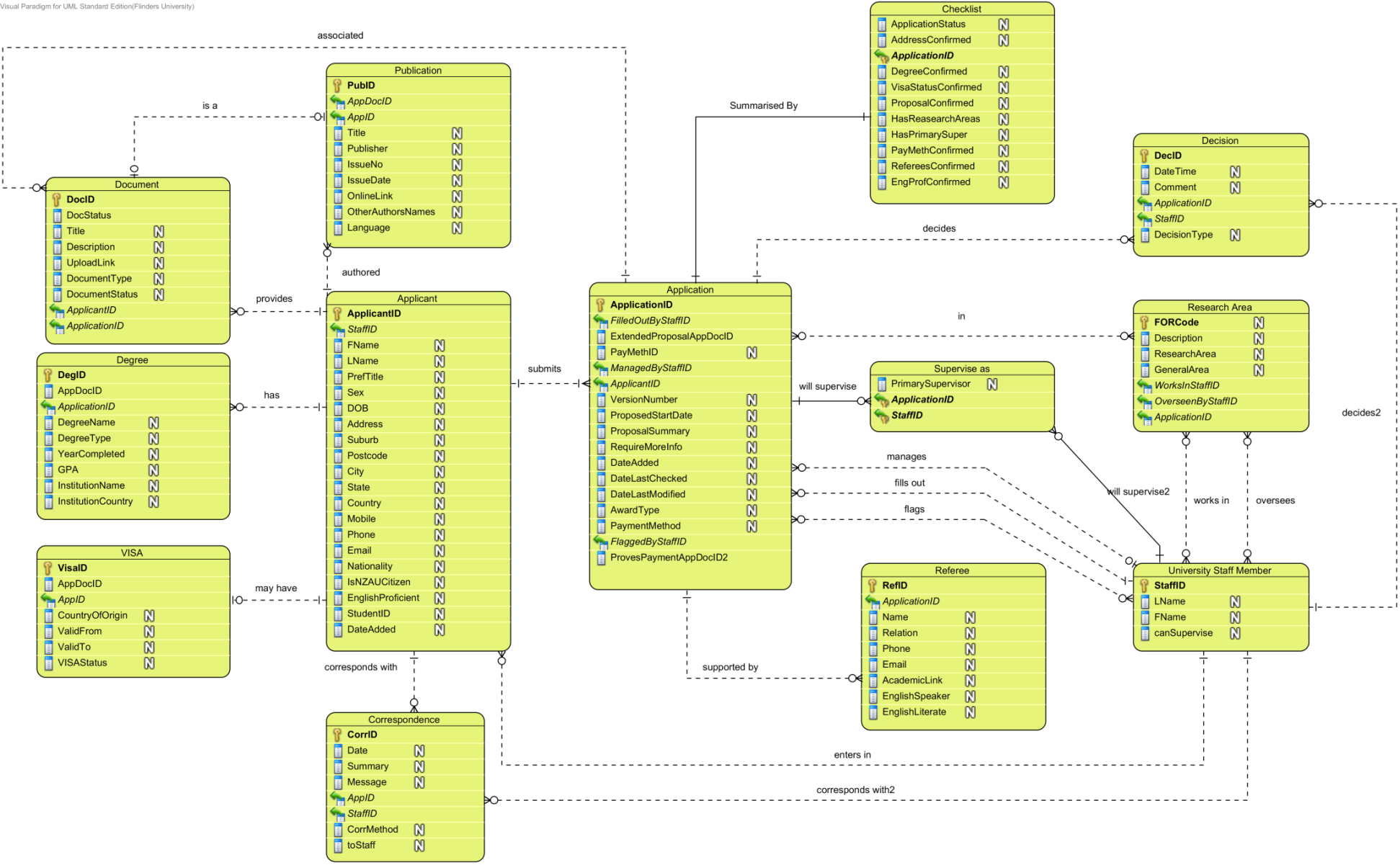
[11. Section 22](#_Toc387865708)

[11.1. Subsection 22](#_Toc387865709)

[11.1.1. Subsubsection 22](#_Toc387865710)

# Derive relations

## Conceptual E-R diagram



## Strong Entity types

|  |
| --- |
| **Applicant** (ApplicantID, FName, LName, PrefTitle, Sex, DOB, StreetAddress, Suburb, Postcode, City, State, Country, Mobile, Phone, Email, Nationality, isNZAUCitizen, EnglishProficient, StudentID, DateAdded)  **Primary key** ApplicantID  **Alternate key** (FName, LName, DOB, StreetAddress, Suburb, Postcode, City, State, Country) |
| **Application** (ApplicationID, ProposedStartDate, ProposalSummary, RequireMoreInfo, DateAdded, DateLastChecked, DateLastModified, AwardType, flindersCampus, fullTime, PaymentMethod)  **Primary key** ApplicationID |
| **Correspondence** (CorrID, Date, Summary, Message, CorrMeth, toStaff)  **Primary key** CorrID |
| **Decision** (DecID, DateTime, Comment, DecisionType)  **Primary key** DecID |
| **Degree** (DegID, DegreeName, DegreeType, YearCompleted, GPA, InstitutionName, InstituitonCountry)  **Primary key** DegID |
| **Document** (DocID, UploadLink, DocStatus, DocumentType, Title, Description)  **Primary key** UploadLink |
| **Publication** (PubID, ApplicantID, Title, Publisher, IssueNo, IssueDate, OnlineLink, OtherAuthorsNames, Language)  **Primary key** PubID |
| **Referee** (RefID, Name, Relation, Phone, Email, AcademicLink, EnglishSpeaker, EnglishLiterate)  **Primary key** RefID |
| **Research Area** (FORCode, Description, ResearchArea, GeneralArea)  **Primary key** FORCode |
| **University Staff Member** (StaffID, FName, LName, canSupervise)  **Primary key** StaffID |
| **Visa** (VisaID, VISAStatus, CountryOfOrigin, ValidFrom, ValidTo)  **Primary key** VisaID |

## Weak Entity types

|  |
| --- |
| **Checklist** (ApplicationStatus, AddressConfirmed, DegreeConfirmed, VisaStatusConfirmed, ProposalConfirmed, HasResearchArea, HasPrimarySuper, PayMethConfirmed, RefrereesConfirmed, EngProfConfirmed)  **Primary key** None (at this stage) |
| **Supervise as** (PrimarySupervisor)  **Primary key** None (at this stage) |

## One-to-many binary relationships

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| associated | No | Application | 0..1 | ApplicationID | Document | 0..\* |
| authored | No | Applicant | 1..1 | ApplicantID | Publication | 0..\* |
| corresponds with | No | Application | 1..1 | ApplicationID | Correspondence | 0..\* |
| corresponds with2 | No | University Staff Member | 1..1 | StaffID | Correspondence | 0..\* |
| decides | No | Application | 1..1 | ApplicationID | Decision | 0..\* |
| decides2 | No | University Staff Member | 1..1 | StaffID | Decision | 0..\* |
| has | Yes | Applicant | 1..1 | ApplicantID | Degree | 0..\* |
| last to modify |  | University Staff Member | 1..1 | StaffID → LastToModifyStaffID | Applicant | 0..\* |
| last to update | No | University Staff Member | 1..1 | StaffID →LastToUpdateStaffID | Application | 0..\* |
| manages | No | University Staff Member | 0..1 | StaffID → ManagedByStaffID | Application | 0..\* |
| provides | No | Applicant | 1..1 | ApplicantID | Document | 0..\* |
| submits | Yes | Applicant | 1..1 | ApplicantID | Application | 0..\* |
| supported by | No | Application | 1..1 | ApplicationID | Referee | 1 |
| will supervise | Yes | Application | 1..1 | ApplicationID | Supervise as | 0..\* |
| will supervise2 | Yes | University Staff Member | 1..1 | StaffID | Supervise as | 0..\* |

## One-to-one binary relationships

### Mandatory on both sides

For the **Application *summarised by* Checklist** relationship, we bring all the attributes of **Checklist** into **Application**. The primary key remains ApplicationID; **Checklist** was a weak entity and never had a primary key. The **Checklist** relation is dropped.

|  |
| --- |
| **Application** (ApplicationID, ApplicationStatus, AddressConfirmed, DegreeConfirmed, VisaStatusConfirmed, ProposalConfirmed, HasResearchAreas, HasPrimarySuper, PayMethConfirmed, EngProfConfirmed, RefereesConfirmed, LastToUpdateStaffID, ProposedStartDate, ProposalSummary, RequireMoreInfo, DateAdded, DateLastChecked, DateLastModified, AwardType, PaymentMethod, flindersCampus, fullTime)  **Primary key** ApplicationID |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| Summarised by | Yes | Application | 1 | ApplicationID | Checklist | 1 |

### Mandatory on one side

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| may have | No | Applicant | 1 | ApplicantID | VISA | 0..1 |

### Optional on both sides

None in this case.

## One-to-one recursive relationships

None in this case.

## Superclass/subclass relationships

None in this case.

## Many-to-many binary relationship types

### University Staff Member *works in* Research Area

Introduce the following relation:

|  |
| --- |
| **University Staff Member\_Research Area** (StaffID, FORCode)  **Primary key** StaffID, FORCode  **Foreign key** StaffID **references** University Staff Member(StaffID)  **Foreign key** FORCode **references** Research Area(FORCode) |

Introduce the following relationships:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| works in | Yes | University Staff Member | 1 | StaffID | University Staff Member\_Research Area | 0..\* |
| works in2 |  | Research Area | 1 | FORCode | University Staff Member\_Research Area | 0..\* |

### University Staff Member *oversees* Research Area

Introduce the following relation:

|  |
| --- |
| **University Staff Member\_Research Area2** (StaffID, FORCode)  **Primary key** StaffID, FORCode  **Foreign key** StaffID **references** University Staff Member(StaffID)  **Foreign key** FORCode **references** Research Area(FORCode) |

Introduce the following relationships:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| Oversees | Yes | University Staff Member | 1 | StaffID | University Staff Member\_Research Area2 | 0..\* |
| Oversees2 | Yes | Research Area | 1 | FORCode | University Staff Member\_Research Area2 | 0..\* |

### Application *in* Research Area

Introduce the following relation:

|  |
| --- |
| **Application\_Research Area** (ApplicationID, FORCode)  **Primary key** ApplicationID, FORCode  **Foreign key** ApplicationID **references** Application(ApplicationID)  **Foreign key** FORCode **references** Research Area(FORCode) |

Introduce the following relationships:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| in |  | Application | 1 | ApplicationID | Application\_Research Area | 1..\* |
| in2 |  | Research Area | 1 | FORCode | Application\_Research Area | 0..\* |

### University Staff Member *flags* Application

Introduce the following relation:

|  |
| --- |
| **University Staff Member\_Application** (StaffID, ApplicationID)  **Primary key** StaffID, ApplicationID  **Foreign key** StaffID **references** University Staff Member(StaffID)  **Foreign key** ApplicationID **references** Application(ApplicationID) |

Introduce the following relationships:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| flags | Yes | University Staff Member | 1 | StaffID | University Staff Member\_Application | 0..\* |
| flags2 | Yes | Application | 1 | ApplicationID | University Staff Member\_Application | 0..\* |

## Complex relationship types

None in this case

## Multi-valued attributes

None in this case

## Discussion DELETE THIS

Should we add an Application to Document relation to deal with nonspecific documents?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entity Name 1** | **multiplicity** | **Relationship Name** | **multiplicity** | **Entity Name 2** | **Rel#** |
| **Application** | 1 | Has a non-specific | 0..\* | Document | **2.5** |

Maybe it would be better to add a single document relation that matches a document (that includes its applicant) to an application and remove all other document relations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entity Name 1** | **multiplicity** | **Relationship Name** | **multiplicity** | **Entity Name 2** | **Rel#** |
| **Application** | 1 | Confirmed by | 0..\* | **ApplicationDocument** | **2.5** |
| **ApplicationDocument** | 1 | Confirmed by2 | 0..\* | **Document** | **27.1** |
| **Applicant** | 1 | Details by | 0..\* | **Document** | **1.6** |

# Normalisation

|  |  |  |
| --- | --- | --- |
| **Relation** | **Functional Dependencies** | **Remarks** |
| Applicant | ApplicantID → FName, LName, PrefTitle, Sex, DOB, StreetAddress, Suburb, Postcode, City, State, Country, Mobile, Phone, Email, Nationality, isNZAUCitizen, EnglishProficient, StudentID, DateAdded, LastToModifyStaffID  FName, LName, DOB, StreetAddress, Suburb, Postcode, City, State, Country → ApplicantID, PrefTitle, Mobile, Phone, Email, Nationality, isNZAUCitizen, EnglishProficient, StudentID, DateAdded, LastToModifyStaffID  FName, LName, DOB, Email → ApplicantID, PrefTitle, StreetAddress, Suburb, Postcode, City, State, Country Mobile, Phone, Nationality, isNZAUCitizen, EnglishProficient, StudentID, DateAdded, LastToModifyStaffID | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Application | ApplicationID → ApplicantID, AddressConfirmed, DegreeConfirmed, VisaStatusConfirmed, ProposalConfirmed, HasResearchAreas, HasPrimarySuper, PayMethConfirmed, EngProfConfirmed, RefereesConfirmed, LastToUpdateStaffID, ProposalDocID, AwardType, ManagedByStaffID, ProposedStartDate, ProposedSummary, RequireMoreInfo, DateAdded, DateLastChecked, DateLastModified, PayDocID, PaymentMethod, ApplicationStatus, flindersCampus, fullTime | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Correspondence | CorrID → Date, Summary, Message, ApplicationID, StaffID, CorrMethID, toStaff | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Decision | DecID → Date, Comment, ApplicationID, StaffID | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Degree | DegID →ApplicantID, Name, Type, YearCompleted, GPA, InstitutionName, InstituitonCountry  ApplicantID, Name → DegID, Type, YearCompleted, GPA, InstitutionName, InstituitonCountry | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Document | DocID → UploadLink, DocStatus, DocumentType, Title, Description, ApplicantID, ApplicationID  UploadLink → DocID, DocStatus, DocumentType, Title, Description, ApplicantID, ApplicationID | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Publication | PubID → ApplicantID, DocID, Title, Publisher, IssueNo, IssueDate, OnlineLink, OtherAuthorsNames, Language | Attributes Publication, IssueNo, IssueDate, OnlineLink and OtherAuthorsNames are optional, therefore should not be considered as candidate keys.  No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Referee | RefID → ApplicationID, Name, Relation, Phone, Email, Profession, AcademicLink, EnglishSpeaker, EnglishLiterate | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| ResearchArea | FORCode → Description, ResearchArea, GeneralArea | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| University Staff Member | StaffID → LName, FName, canSupervise | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |
| Visa | VisaID → ApplicantID, VisaStatus, OriginCountry, ValidFrom, ValidTo | No repeating groups.  No partial dependencies.  No transitive dependencies.  Primary key fully determines non-primary-key attributes  ⇒ in 3NF |

## Lookup relations

In this schema there are several attributes with domains that allow only a small set of possible values. These attributes are Applicant(Nationality), Applicant(Country), Application(ApplicationStatus), Application(PaymentMethod), Document(DocumentStatus), Document(DocumentType), Visa(VisaStatus), Decision(DecisionType), Correspondence(CorrespondencMethod), and Award(AwardType).

In order to reduce the chance of update anomalies from keying-in incorrect values, we choose to create a lookup relation for each of these. In all cases, these relations are in one-to-many relationships with the relations containing their corresponding attributes. So, in each case, the lookup relation is designated the parent relation, the other relation is designated the child, and the primary key of the lookup table is posted to the child relation in place of the attribute.

This approach also has the benefit that users can: alter the associated description/types easily; or extend these domains to cover new cases as they arise.

|  |
| --- |
| **ApplicationStatus** (Status, Description)  **Primary key** Status |
| **Decision Type** (Type)  **Primary key** Type |
| **CorrespondenceMethod** (method)  **Primary key** Method |
| **AwardType** (Type, Description, Method)  **Primary key** Type |
| **Payment Method** (Method)  **Primary key** Method |
| **DocumentStatus** (Status, Description)  **Primary key** Status |
| **DocumentType** (Type, Description)  **Primary key** Type |
| **Visa Status** (Status, Description)  **Primary key** Status |
| **Country** (CountryISOCode, Name)  **Primary key** CountryISOCode |

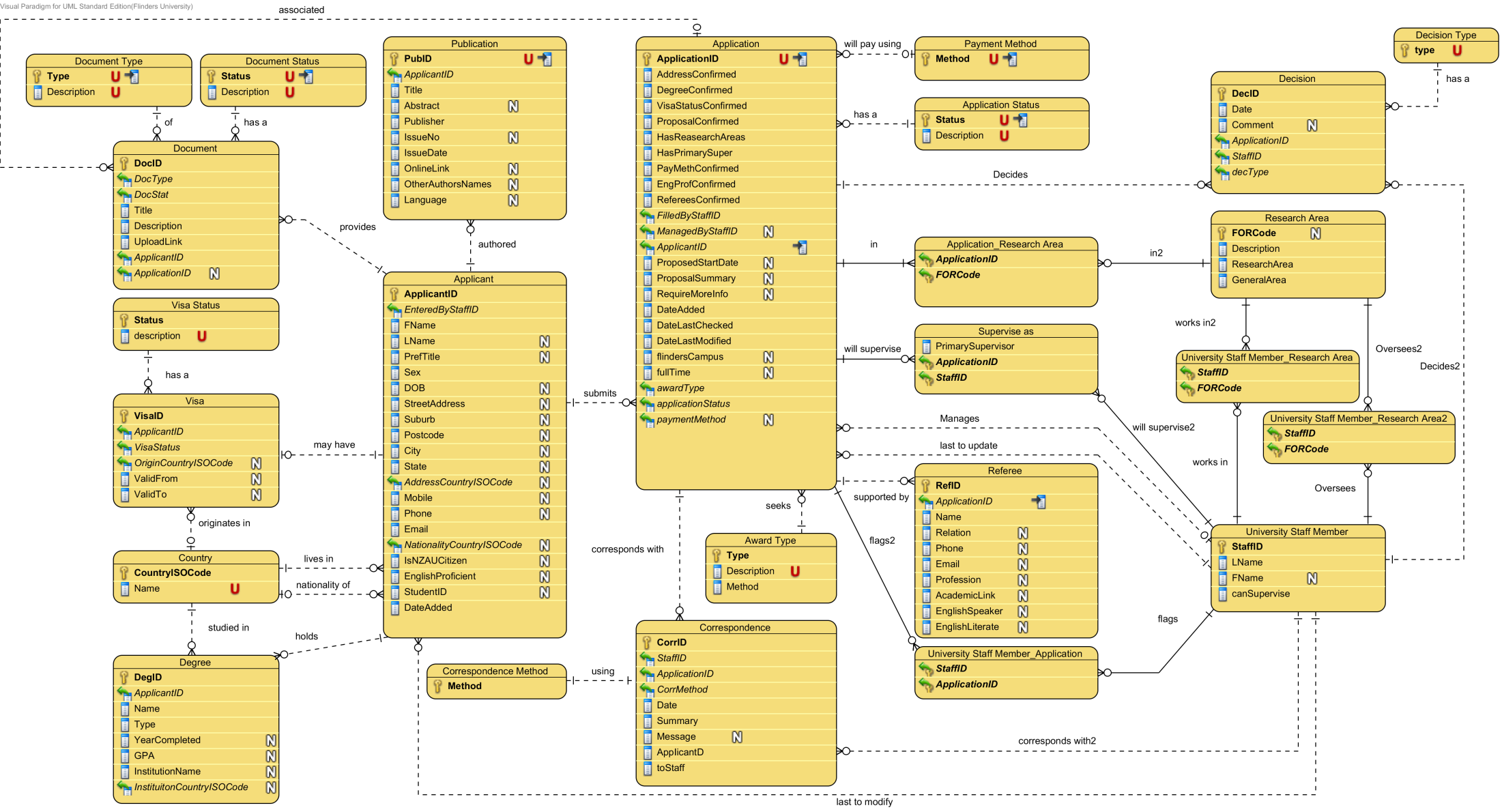
### Lookup relationships

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Relationship name** | **Identifying** | **Parent relation** | **Parent multiplicity** | **Foreign Keys** | **Child relation** | **Child multiplicity** |
| lives in | No | Country | 1..1 | CountryISOCode→ AddressCountryISOCode | Applicant | 0..\* |
| nationality of | No | Country | 0..1 | CountryISOCode→ NationalityCountryISOCode | Applicant | 0..\* |
| has a | No | Visa Status | 1..1 | VisaStatus | Visa | 0..\* |
| originates in | No | Country | 1..1 | CountryISOCode → OriginCountryISOCode | Visa | 0..\* |
| has a | No | Document Status | 1..1 | Status → DocStat | Document | 0..\* |
| of | No | Document Type | 1..1 | Type → DocType | Document | 0..\* |
| will pay using | No | Payment Method | 0..1 | Method →paymentMethod | Application | 0..\* |
| has a | No | Application Status | 1..1 | Status → applicationStatus | Application | 0..\* |
| has a | No | Decision Type | 1..1 | type → decType | Decision | 0..\* |

## Normalised Relations

|  |
| --- |
| **Applicant** (ApplicantID, FName, LName, PrefTitle, Sex, DOB, StreetAddress, Suburb, Postcode, City, State, AddressCountryISOCode, Mobile, Phone, Email, NationalityCountryISOCode, isNZAUCitizen, EnglishProficient, StudentID, DateAdded, LastToModifyStaffID)  **Primary key** ApplicantID  **Alternate key** (FName, LName, DOB, StreetAddress, Suburb, Postcode, City, State, Country)  **Alternate key** (FName, LName, DOB, Email)  **Foreign key** LastToModifyStaffID **references** University Staff Member(StaffID)  **Foreign key** AddressCountryISOCode **references** Country(CountryISOCode)  **Foreign key** NationalityCountryISOCode **references** Country(CountryISOCode) |
| **Application** (ApplicationID, applicationStatus, AddressConfirmed, DegreeConfirmed, VisaStatusConfirmed, ProposalConfirmed, HasResearchAreas, HasPrimarySuper, PayMethConfirmed, EngProfConfirmed, RefereesConfirmed, LastToUpdateStaffID, ProposedStartDate, ProposalSummary, RequireMoreInfo, DateAdded, DateLastChecked, DateLastModified, awardType, flindersCampus, fullTime, paymentMethod)  **Primary key** ApplicationID  **Foreign key** ApplicantID **references** Application(ApplicationID)  **Foreign key** LastToUpdateStaffID **references** University Staff Member(StaffID)  **Foreign key** ManagedByStaffID **references** University Staff Member(StaffID)  **Foreign key** awardType **references** AwardType(Type)  **Foreign key** applicationStatus **references** Application Status(Status)  **Foreign key** paymentMethod **references** Payment Method(Method) |
| **Application\_Research Area** (ApplicationID, FORCode)  **Primary key** ApplicationID, FORCode  **Foreign key** ApplicantID **references** Application(ApplicationID)  **Foreign key** FORCode **references** Research Area(FORCode) |
| **Application Status** (Status, Description)  **Primary key** Status |
| **AwardType** (Type, Description, Method)  **Primary key** Type |
| **Correspondence** (CorrID, Date, Summary, Message, ApplicantID, StaffID, CorrMeth, toStaff  **Primary key** CorrID  **Foreign key** ApplicantID **references** Applicant(ApplicantID)  **Foreign key** StaffID **references** UniversityStaffMember(StaffID)  **Foreign key** CorrMethod **references** Correspondence Method(Method) |
| **Correspondence Method** (Method)  **Primary key** Method |
| **Country** (CountryISOCode, Name)  **Primary key** CountryISOCode |
| **Decision** (DecID, Date, Comment, ApplicationID, StaffID, decType)  **Primary key** DecID  **Foreign key** ApplicationID **references** Application(ApplicationID)  **Foreign key** StaffID **references** UniversityStaffMember(StaffID)  **Foreign key** DecTypeID **references** Decision Type(type) |
| **Decision Type** (type)  **Primary key** type |
| **Degree** (DegID, ApplicantID, Name, Type, YearCompleted, GPA, InstitutionName, InstitutionCountryISOCode)  **Primary key** DegID  **Foreign key** ApplicantID **references** Applicant(ApplicantID)  **Foreign key** InstituitonCountryISOCode **references** Country(CountryISOCode) |
| **Document** (DocID, UploadLink, Title, Description, DocType, DocStat, ApplicantID, ApplicationID)  **Primary key** UploadLink  **Foreign key** DocType **references** DocumentType(Type)  **Foreign key** DocStat **references** DocumentStatus(Status)  **Foreign key** ApplicantID **references** Applicant(ApplicantID)  **Foreign key** ApplicationID **references** Application(ApplicationID) |
| **DocumentStatus** (Status, Description)  **Primary key** Status |
| **DocumentType** (Type, Description)  **Primary key** Type |
| **Payment Method** (Method)  **Primary key** Method |
| **Publication** (PubID, ApplicantID, Title, Publisher, IssueNo, IssueDate, OnlineLink, OtherAuthorsNames, Language)  **Primary key** PubID  **Foreign key** ApplicantID **references** Applicant(ApplicantID) |
| **Referee** (RefID, ApplicationID, Name, Relation, Phone, Email, AcademicLink, EnglishSpeaker, EnglishLiterate)  **Primary key** RefID  **Foreign key** ApplicationID **references** Application(ApplicationID) |
| **Research Area** (FORCode, Description, ResearchArea, GeneralArea)  **Primary key** FORCode |
| **Supervise as** (StaffID, ApplicationID, PrimarySupervisor)  **Primary key** StaffID, ApplicationID  **Foreign key** ApplicationID **references** Application(ApplicationID)  **Foreign key** StaffID **references** University Staff Member(StaffID) |
| **University Staff Member** (StaffID, FName, LName, canSupervise)  **Primary key** StaffID |
| **University Staff Member\_Application** (StaffID, ApplicationID)  **Primary key** StaffID, ApplicationID  **Foreign key** StaffID **references** University Staff Member(StaffID)  **Foreign key** ApplicationID **references** Application(ApplicationID) |
| **University Staff Member\_Research Area** (StaffID, FORCode)  **Primary key** StaffID, FORCode  **Foreign key** StaffID **references** University Staff Member (StaffID)  **Foreign key** FORCode **references** Research Area(FORCode) |
| **University Staff Member\_Research Area2** (StaffID, FORCode)  **Primary key** StaffID, FORCode  **Foreign key** StaffID **references** University Staff Member (StaffID)  **Foreign key** FORCode **references** Research Area(FORCode) |
| **Visa** (VisaID, ApplicantID, OriginCountryISOCode, VISAStatus, ValidFrom, ValidTo)  **Primary key** VisaID  **Foreign key** ApplicantID **references** Applicant(ApplicantID)  **Foreign key** OriginCountryISOCode **references** Country(CountryISOCode) |
| **Visa Status** (Status, Description)  **Primary key** Status |

## Logical E-R Diagram



# User transaction validation

University Staff Members

|  |  |
| --- | --- |
|  | Look up applicant + publications + degrees + visa Status + Associated documents by applicant name |
|  | Look up applicant’s applications by applicant name |
|  | Look up applicant’s applications by applicant email |
|  | Look up incomplete applications |
|  | Look up all correspondences relevant to an application |
|  | Create new applicant and associated application records |
|  | Look up which staff member updated an Application most recently |
|  | Check for any decision recorded about an application |
|  | Look up an existing application and attach a new standard type document to an application |
|  | Look up an existing application and attached a new exceptional type document to an application |
|  | Look up an existing application and list outstanding information (checklist). |
|  | Update the checklist to confirm that a mandatory information requirement has been met |
|  | Retrieve all on-going applications for which the user has made the most recent correspondence |
|  | Record making a decision about an application |
|  | Update the status of an application |

Academic Staff

|  |  |
| --- | --- |
|  | Look up, add to, and delete from own current research areas |
|  | Search for all applications in certain research areas that have been added since a certain time |
|  | Flag interest in an application |

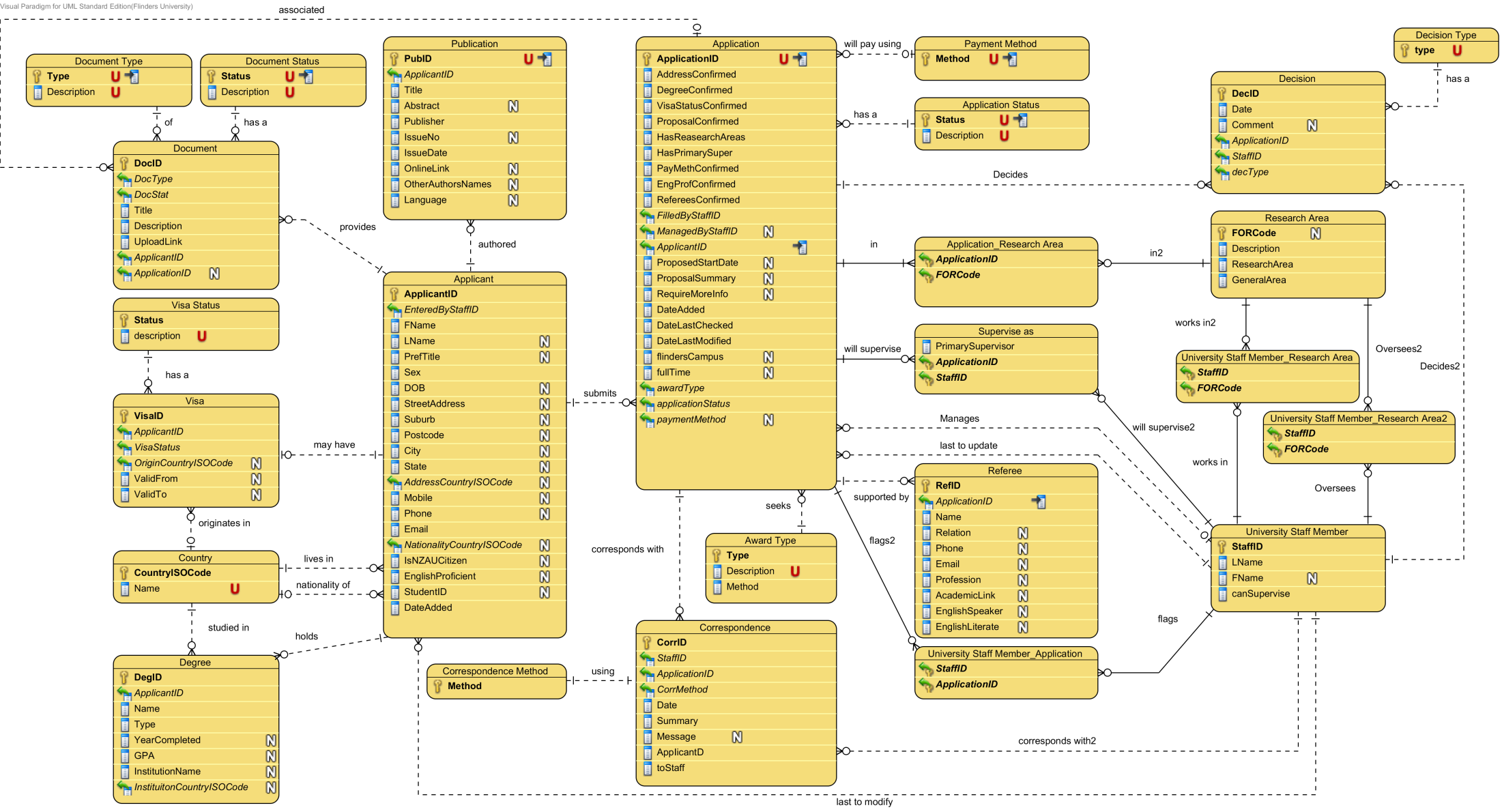
RHD Co-ordination Staff

|  |  |
| --- | --- |
|  | Retrieve all staff who have flagged an application, or have edited an application or applicant record most recently |
|  | Retrieve all ongoing applications |

Note that the following modelling changes were triggered when validating user transactions:

* (e) – we had Correspondence in relationship with Applicant, but that could not record which correspondence was in regard to which application. We changed this to have Correspondence in relationship Application.

## Transaction pathways



a1

a2

a3

a4

a5, i, j

b, c,

f, i

e, m

r

s

g, s

r

s

p

p

q

q

h, n

d, t, o

k, l, o

# Check integrity constraints (Sam)

The following type of integrity constraints have been added to the logical model to protect the database from becoming incomplete, inaccurate, or inconsistent.

## Required data

The not null attributes identified in section 3 of the conceptual Documentation have been specified in the diagram. Since by default attributes in VP UML are null-able the specific null-able attributes changed are:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Applicant** | | **Degree** | | **ResearchArea** | | |
| fName | 1.1 | name | 4.1 | FORCode | | 9.1 |
| sex | 1.4 | type | 4.2 | Description | | 9.2 |
| email | 1.15 |  |  | researchArea | | 9.3 |
| dateAdded | 1.20 |  |  | generalArea | | 9.4 |
| **Application** | |  |  | **University Staff Member** | | |
| dateAdded | 2.3 |  |  | staffID | | 12.1 |
| dateLastChecked | 2.4 | **Document** | | lName | | 12.3 |
| dateLastModified | 2.5 | Title | 5.1 |  | |  |
| awardType | 2.7 | uploadLink | 5.3 | **Visa** | | |
| **Checklist** | | documentType | 5.4 | VisaStatus | | 13.3 |
| applicationStatus | 3.1 | documentStatus | 5.5 | **Correspondence** | | |
| addressConfirmed | 3.2 | **Publication** | | date | | 14.1 |
| degreeConfirmed | 3.3 | title | 7.1 | Summary/message | | 14.2 |
| visaConfirmed | 3.4 | publisher | 7.3 | corrMeth | | 14.4 |
| proposalConfirmed | 3.5 | issueDate | 7.5 | toStaff | 14.5 | |
| engProfConfirmed | 3.6 |  |  | **Decision** | | |
| hasResearchAreas | 3.7 |  |  | date | | 15.1 |
| hasPrimarySuper | 3.8 | **Referee** | | decType | 15.2 | |
| payMethConfirmed | 3.9 | name | 8.1 | **SuperviseAs** | | |
| refereesConfirmed | 3.10 | relation | 8.2 | primarySupervisor | | 16.1 |
|  |  | email | 8.4 |  | |  |
|  |  | Profession | 8.5 |  | |  |

Note that some of these attributes are moved to separate entities in the next section, in these cases the foreign key will be not null. Furthermore any attributes added to one of these entities will also be not null-able and unique.

## Attribute domain constraints

The attribute domains as identified in section 4 of the conceptual documentation have been added to the diagram in the form of the following new entities.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Entity Name** | **Aliases** | **Description** | **Occurrences (select multiplicities)** | **Entity #** |
| Application status | - | A list of application status and who manages the application | a set number of predefined status reusable by all Applications | 17 |
| Award Type | - | The Award sought by the Application | a set number of predefined Award types reusable by all Applications | 18 |
| Correspondence Method | - | How the applicant and staff member corresponded | set number of predefined correspondence methods reusable by all correspondences | 19 |
| Country | - | A list of possible countries the application can live in or be a citizen of. | A set number of predefined countries reusable by all applicants | 20 |
| Decision Type | Change Type | The types of decisions a RHD Staff Member can make about an Application | A set number of predefined decisions types reusable by all decisions | 21 |
| Document status | - | Official and translation status of a document associated to an Applicant | a set number of predefined documents status reusable by all Documents | 22 |
| Document Type | - | The type of document | a set number of predefined document types reusable by all Documents | 23 |
| Payment Method | - | The proposed method of payment for the RHD | a set number of predefined payment methods reusable by all Applications | 24 |
| Study Load and Location | - | The proposed study load for the RHD and the location of the RHD | a set number of predefined study loads and locations reusable by all Applications | 25 |
| Visa status | - | The applicants visa status | a set number of predefined visa status reusable by all Visas | 26 |

Attributes were added to each entity such that,

* Status entities have a status and a description attribute,
* Type entities have a type and a description attribute,
* Method entities have a method attribute and
* The Country entity has a name attribute while Study Load and Location has a LoadLocation attribute.

## Multiplicity

The multiplicities identified in section 2 of the conceptual documentation have been added to the diagram. The additional multiplicities for the attribute domain entities identified in section 4.2 have identified in the following table and added to the diagram.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Entity Name 1** | **multiplicity** | **Relationship Name** | **multiplicity** | **Entity Name 2** | **Rel#** |
| **Applicant** | 0..\* | Lives in | 0..1 | Country | **1.6** |
| 0..\* | Nationality of | 0..1 | Country | **1.7** |
| **Application** | 0..\* | Seeks | 0..1 | Award Type | **2.5** |
| 0..\* | will pay using | 0..1 | Payment Method | **2.6** |
| 0..\* | Study using | 0..1 | Study Load and Location | **2.7** |
| **Checklist** | 0..\* | Has a | 1 | Application status | **3.1** |
| **Correspondence** | 0..\* | Using | 1 | Correspondence Method | **14.1** |
| **Decision** | 0..\* | Has a | 1 | Decision Type | **15.1** |
| **Document** | 0..\* | Has a | 1 | Document status | **5.6** |
| 0..\* | of | 1 | Document Type | **5.7** |
| **Visa** | 0..\* | Has a | 1 | Visa Status | 13.1 |

## Entity integrity

The primary keys identified in section 5 of the conceptual documentation have been added to/updated in the diagram. The additional primary keys for the attribute domain entities identified in section 4.2 have been identified in the following table and added to the diagram

|  |  |  |  |
| --- | --- | --- | --- |
| **Entity Name** | **Primary Key** | **Alternative Key** | **Entity#** |
| Application status | appStatusID | status, description | 17 |
| Award Type | awardTypeID | award, description | 18 |
| Correspondence Method | corrMethID | method | 19 |
| Country | CountryISOCode | name | 20 |
| Decision Type | decTypeID | type | 21 |
| Document status | docStatID | status, description | 22 |
| Document Type | docTypeID | type, description | 23 |
| Payment Method | payMethID | method | 24 |
| Study Load and Location | loadLocID | loadLocation | 25 |
| Visa status | visaStatID | status | 26 |

## Referential integrity

The primary key of each child relation (called entity name 2) has been added to the parent relation (called entity name 1) in the form of a foreign key as specified by the entity relationship table in section 2 of the conceptual documentation and the entity relationship table in the above section 4.3.

It should be noted however that the attribute domain relations Identified in section 4.1 that replace null-able attributes will add their primary key as a null-able foreign keys in the parent relation. More specifically Award Type, Country, Payment Method and Study Load and Location can all be null in the applicant/applicant entities because they may not be known at the time of the initial input of the entry. Similarly anything that can be potentially backed by a document will have a null document ID foreign key.

## General constraints.

Currently there are no high level constraints that will affect the validity of the logical model. There are however pseudo constraints through the checklist whereby an application cannot have certain application statuses unless the corresponding checklist attributes are true.

# Review logical data model ()

The Logical data model will be reviewed with Paul, the head of the Research Higher Degree Office to ensure that I meets all their requirements and is a true (or as close to possible) representation of the data requirements as specified by the Research Higher Degree Office and the staff members who will use the database.

# Check for future growth ()

The initial setup for the database has been considered in the context of the minimal amount of information required to define an entry for any of the strong entitles Identified in section 1 of the conceptual documentation. This is primarily expressed through the choice of null-able attributes and null-able foreign keys that is foreign keys from 0.. relationships.

The entities, their relationships and the diagram itself have been considered from a growth perspective. That is, applicants will submit different applications, their details may change and this needs to be reflected in previous applications.

Deletions and updates …

# Develop Test Plan

# Data dictionary

# Conceptual E-R Diagram

# Logical E-R Diagram

# Section

## Subsection

### Subsubsection

Diagram improvements

* Add data types
* ID names

Make GPA decimal (1,2)

Only have one primary supervisor

Publication may need date or issue no# not null