**Project Report**

Captcha Generator System

|  |  |
| --- | --- |
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# INTRODUCTION

## PROJECT DESCRIPTION

The Captcha Generator System Database stores information about the verification, authorization, user, image,userimage, imagerecod, math, usermath, mathrecord,text, usertext, textrecord, background, sound, usersound, soundrecord of a system.Database has four types(image, math, text and sound).The following data have been identified in the requirements collection and analysis phase and they are to be represented in the enterprise:

• Verification has a unique verification\_id, and a code that verified the user. The Captcha Generator System is verified into verification.

• Authorization has a unique authorization\_id, system\_log\_no, last\_login\_date, current\_login\_date, user\_id(foreign key references to Users table).This entity is used for keeping track of users' log history.

• Users has a unique user\_id, name, lastName, email, control\_captcha(checking of captcha validation), activate(checking of verification validation).This entity is used for keeping users’ information.

• Images have a unique image\_id, image\_type, image\_path (multivalue, there are 9 different types of paths), correct\_image\_no (multivalue).

• UserImage has unique user\_image\_id, image\_id(foreign key references to Images table), user\_id(foreign key references to Users table), selected\_image\_no(multivalue, user must select 3 images).

• ImageRecord has a unique image\_record\_id, trial\_no(number of trials), refresh\_times(number of captchas that will be sent to user), userimage\_id(foreign key references to UserImage table).

• Math has a unique math\_id, first\_operand, second\_operand, operation, result(its not suitable for 3NF so, its removed).

• UserMath has a unique user\_math\_id, user\_result, math\_id(foreign key references to Math table), user\_id(foreign key references to Users table).

• MathRecord has a unique math\_record\_id, trial\_no, refresh\_times, user\_math\_id.

• Sound has a unique sound\_id, sound\_sec(time length of the sound), sound\_word(users should hear), sound\_type(such as magic, robotic…), sound\_language(multivalue, it has 4 languages).

• UserSound has a unique user\_sound\_id, user\_language, user\_word( word that user enters what s/he hears), sound\_id(foreign key references to Sound table), user\_id(foreign key references to Users table).

• SoundRecord has a unique sound\_record\_id, trial\_no, refresh\_times, user\_sound\_id(foreign key references to UserSound table).

• Texts has a unique text\_id, word, word\_length(removed), font\_family, text\_height, text\_width, char\_space(spaces between characters), bg\_id(foreign key references to Background table), color(multivalue, it has 4 types).

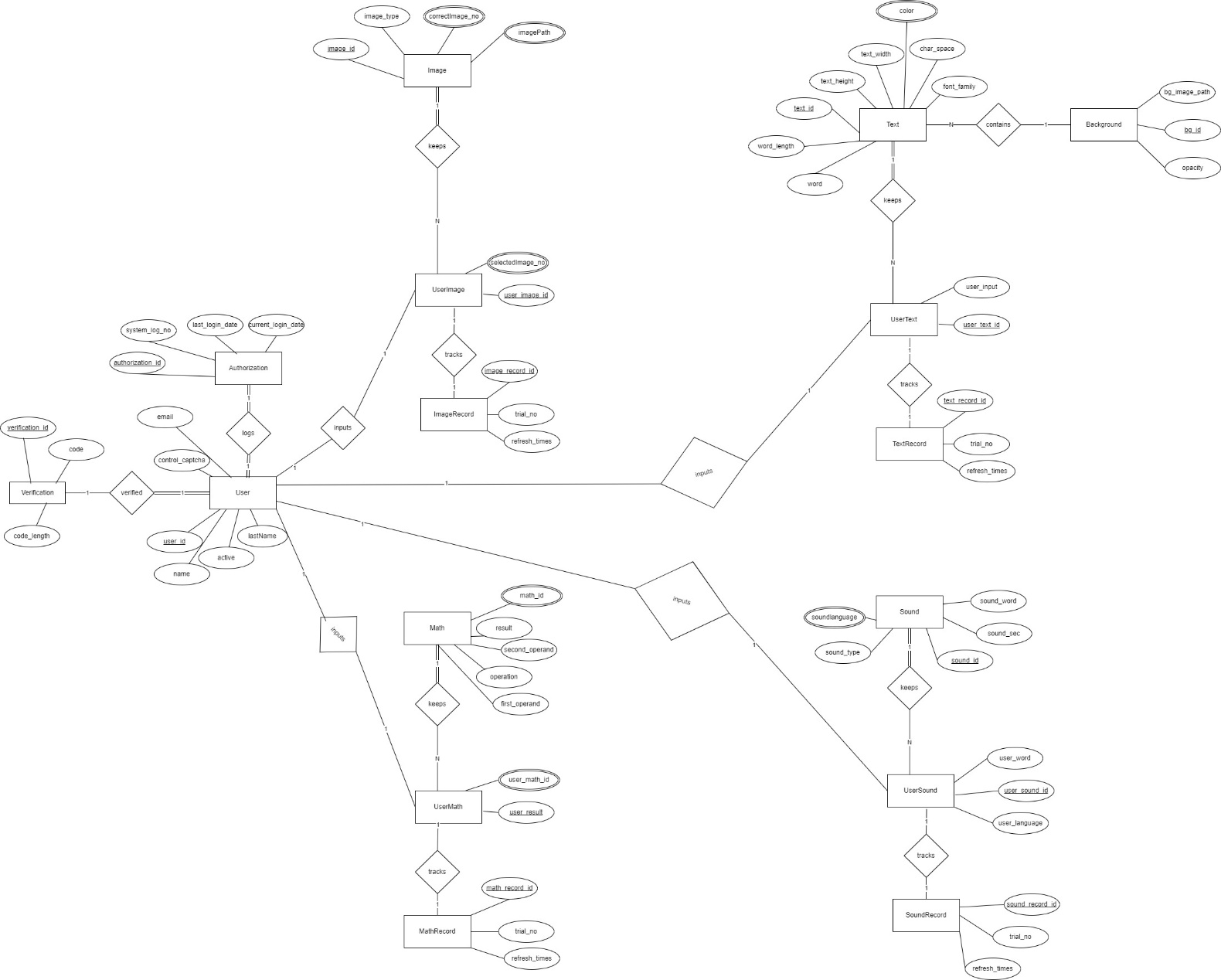
• Background has a unique bg\_id, bg\_image\_path(background image), opacity.

•  UserText has a unique user\_text\_id, user\_input, text\_id(foreign key references to Texts table), user\_id(foreign key references to Users table).

• TextRecord has a unique text\_record\_id, trial\_no, refresh\_times, user\_text\_id(foreign key references to UserText table).

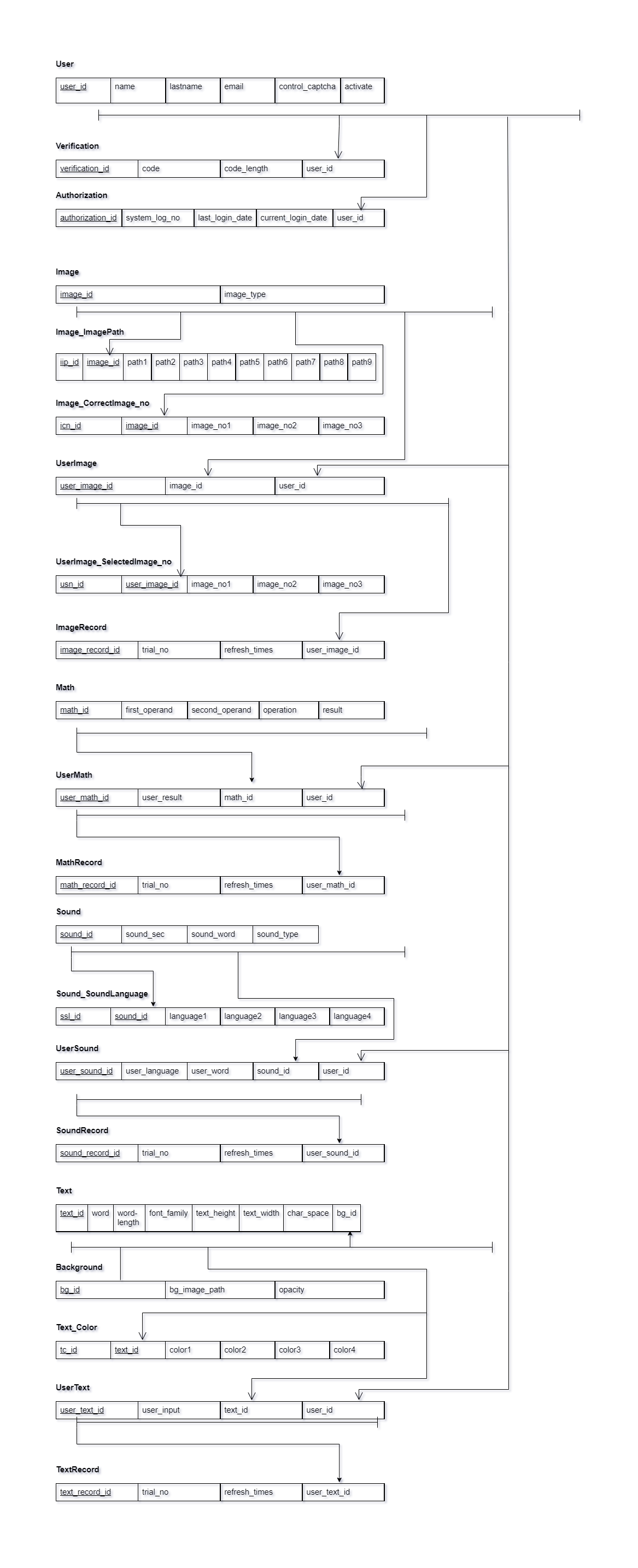
# ENTITY RELATIONAL MODEL

## ENHANCED ER DIAGRAM



**Figure 1:** EER diagram of the Captcha Generator System Database

## RELATIONAL SCHEMA & MAPPING



**Figure 2:** Relational schema of the Captcha Generator System Database with arrows indicating referential integrity

# NORMALIZATION

## FUNCTIONAL DEPENDENCIES

(The following is the set of functional dependencies (FD's) of COMPANY.)

F = { FD1: user\_id→ name, lastName, email , control\_captcha, activate

FD2: verification\_id→code, code\_length, user\_id

FD3: authorization\_id →system\_log\_no, last\_login\_date, current\_login\_date, user\_id

FD4:image\_id → image\_type, correct\_image\_no, image\_path

FD5: user\_image\_id→image\_id, user\_id, selected\_image\_no

FD6: image\_record\_id→trial\_no, refresh\_times, user\_image\_id

FD7: math\_id→ first\_operand, second\_operand, operation, result

FD8: user\_math\_id → user\_result, math\_id, user\_id

FD9: math\_record\_id→ trial\_no, refresh\_times, user\_math\_id

FD10: sound\_id→ sound\_sec, soud\_word, sound\_type, sound\_language

FD11: user\_sorund\_id → user\_language, user\_word, user\_id, sound\_id

FD12: sound\_record\_id→ trial\_no, refresh\_times, user\_sound\_id

FD13: text\_id→ word, word\_length, font\_family, text\_height, text\_width, char\_space, bg\_id, color

FD14: bg\_id → bg\_image\_path, opacity

FD15: user\_text\_id → user\_input, text\_id, user\_id

FD16: text\_record\_id→ trial\_no, refresh\_times, user\_text\_id }

## UNNORMALISED FORM

**User**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| user\_id | name | lastname | email | control\_captcha | activate |

**Verification**

|  |  |  |  |
| --- | --- | --- | --- |
| verification\_id | code | code\_length | user\_id |

**Authorization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| authorization\_id | system\_log\_no | last\_login\_date | current\_login\_date | user\_id |

**Image**

|  |  |  |  |
| --- | --- | --- | --- |
| image\_id | image\_type | correct\_image\_no | image\_path |

**UserImage**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_image\_id | image\_id | user\_id | selected\_image\_no |

**ImageRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| image\_record\_id | trial\_no | refresh\_times | user\_image\_id |

**Math**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| math\_id | first\_operand | second\_operand | operation | result |

**UserMath**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_math\_id | user\_result | math\_id | user\_id |

**MathRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| math\_record\_id | trial\_no | refresh\_times | user\_math\_id |

**Sound**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sound\_id | sound\_sec | sound\_word | sound\_type | sound\_language |

**UserSound**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| user\_sound\_id | user\_language | user\_word | sound\_id | user\_id |

**SoundRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_record\_id | trial\_no | refresh\_times | user\_sound\_id |

**Text**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| text\_id | word | word-length | font\_family | text\_height | text\_width | char\_space | bg\_id | color |

**Background**

|  |  |  |
| --- | --- | --- |
| bg\_id | bg\_image\_path | opacity |

**UserText**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_text\_id | user\_input | text\_id | user\_id |

**TextRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| text\_record\_id | trial\_no | refresh\_times | user\_text\_id |

## FIRST NORMAL FORM

**User**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| user\_id | name | lastname | email | control\_captcha | activate |

**Verification**

|  |  |  |  |
| --- | --- | --- | --- |
| verification\_id | code | code\_length | user\_id |

**Authorization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| authorization\_id | system\_log\_no | last\_login\_date | current\_login\_date | user\_id |

**Image**

|  |  |
| --- | --- |
| image\_id | image\_type |

**Image\_ImagePath**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| iip\_id | image\_id | path1 | path2 | path3 | path4 | path5 | path6 | path7 | path8 | path9 |

**Image\_CorrectImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| icn\_id | image\_id | image\_no1 | image\_no2 | image\_no3 |

**UserImage**

|  |  |  |
| --- | --- | --- |
| user\_image\_id | image\_id | user\_id |

**UserImage\_SelectedImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| usn\_id | user\_image\_id | image\_no1 | image\_no2 | image\_no3 |

**ImageRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| image\_record\_id | trial\_no | refresh\_times | user\_image\_id |

**Math**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| math\_id | first\_operand | second\_operand | operation | result |

**UserMath**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_math\_id | user\_result | math\_id | user\_id |

**MathRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| math\_record\_id | trial\_no | refresh\_times | user\_math\_id |

**Sound**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_id | sound\_sec | sound\_word | sound\_type |

**Sound\_SoundLanguage**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ssl\_id | sound\_id | language1 | language2 | language3 | language4 |

**UserSound**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| user\_sound\_id | user\_language | user\_word | sound\_id | user\_id |

**SoundRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_record\_id | trial\_no | refresh\_times | user\_sound\_id |

**Text**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| text\_id | word | word-length | font\_family | text\_height | text\_width | char\_space | bg\_id |

**Text\_Color**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| tc\_id | text\_id | color1 | color2 | color3 | color4 |

**Background**

|  |  |  |
| --- | --- | --- |
| bg\_id | bg\_image\_path | opacity |

**UserText**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_text\_id | user\_input | text\_id | user\_id |

**TextRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| text\_record\_id | trial\_no | refresh\_times | user\_text\_id |

## SECOND NORMAL FORM

**User**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| user\_id | name | lastname | email | control\_captcha | activate |

**Verification**

|  |  |  |  |
| --- | --- | --- | --- |
| verification\_id | code | code\_length | user\_id |

**Authorization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| authorization\_id | system\_log\_no | last\_login\_date | current\_login\_date | user\_id |

**Image**

|  |  |
| --- | --- |
| image\_id | image\_type |

**Image\_ImagePath**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| iip\_id | image\_id | path1 | path2 | path3 | path4 | path5 | path6 | path7 | path8 | path9 |

**Image\_CorrectImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| icn\_id | image\_id | image\_no1 | image\_no2 | image\_no3 |

**UserImage**

|  |  |  |
| --- | --- | --- |
| user\_image\_id | image\_id | user\_id |

**UserImage\_SelectedImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| usn\_id | user\_image\_id | image\_no1 | image\_no2 | image\_no3 |

**ImageRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| image\_record\_id | trial\_no | refresh\_times | user\_image\_id |

**Math**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| math\_id | first\_operand | second\_operand | operation | result |

**UserMath**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_math\_id | user\_result | math\_id | user\_id |

**MathRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| math\_record\_id | trial\_no | refresh\_times | user\_math\_id |

**Sound**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_id | sound\_sec | sound\_word | sound\_type |

**Sound\_SoundLanguage**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ssl\_id | sound\_id | language1 | language2 | language3 | language4 |

**UserSound**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| user\_sound\_id | user\_language | user\_word | sound\_id | user\_id |

**SoundRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_record\_id | trial\_no | refresh\_times | user\_sound\_id |

**Text**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| text\_id | word | word-length | font\_family | text\_height | text\_width | char\_space | bg\_id |

**Text\_Color**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| tc\_id | text\_id | color1 | color2 | color3 | color4 |

**Background**

|  |  |  |
| --- | --- | --- |
| bg\_id | bg\_image\_path | opacity |

**UserText**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_text\_id | user\_input | text\_id | user\_id |

**TextRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| text\_record\_id | trial\_no | refresh\_times | user\_text\_id |

## THIRD NORMAL FORM

**User**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| user\_id | name | lastname | email | control\_captcha | activate |

**Verification**

|  |  |  |
| --- | --- | --- |
| verification\_id | code | user\_id |

**Authorization**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| authorization\_id | system\_log\_no | last\_login\_date | current\_login\_date | user\_id |

**Image**

|  |  |
| --- | --- |
| image\_id | image\_type |

**Image\_ImagePath**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| iip\_id | image\_id | path1 | path2 | path3 | path4 | path5 | path6 | path7 | path8 | path9 |

**Image\_CorrectImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| icn\_id | image\_id | image\_no1 | image\_no2 | image\_no3 |

**UserImage**

|  |  |  |
| --- | --- | --- |
| user\_image\_id | image\_id | user\_id |

**UserImage\_SelectedImage\_no**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| usn\_id | user\_image\_id | image\_no1 | image\_no2 | image\_no3 |

**ImageRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| image\_record\_id | trial\_no | refresh\_times | user\_image\_id |

**Math**

|  |  |  |  |
| --- | --- | --- | --- |
| math\_id | first\_operand | second\_operand | operation |

**UserMath**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_math\_id | user\_result | math\_id | user\_id |

**MathRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| math\_record\_id | trial\_no | refresh\_times | user\_math\_id |

**Sound**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_id | sound\_sec | sound\_word | sound\_type |

**Sound\_SoundLanguage**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ssl\_id | sound\_id | language1 | language2 | language3 | language4 |

**UserSound**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| user\_sound\_id | user\_language | user\_word | sound\_id | user\_id |

**SoundRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| sound\_record\_id | trial\_no | refresh\_times | user\_sound\_id |

**Text**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| text\_id | word | font\_family | text\_height | text\_width | char\_space | bg\_id |

**Text\_Color**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| tc\_id | text\_id | color1 | color2 | color3 | color4 |

**Background**

|  |  |  |
| --- | --- | --- |
| bg\_id | bg\_image\_path | opacity |

**UserText**

|  |  |  |  |
| --- | --- | --- | --- |
| user\_text\_id | user\_input | text\_id | user\_id |

**TextRecord**

|  |  |  |  |
| --- | --- | --- | --- |
| text\_record\_id | trial\_no | refresh\_times | user\_text\_id |