# Advisor's Tool User Manual

Phillip C.S.R. Kilgore Srđan Ristić Marjan Trutschl
Urška Cvek

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# Chapter 1

# Basic Usage

This manual describes procedures for basic utilization of the tool. It is meant for all beginners, including students and advisors alike. The actions described in this section do not require any special access, unlike the actions described in subsequent sections.

## 1.1 Index Page

The index page is the home page of Advisor's Tool and contains instructions regarding the transcript upload and worksheet filling process.

## 1.2 Transcript Processing

In order to begin processing your transcript, click the *Fill Worksheet* button in the top menu-bar.

### 1.2.1 Input Transcript

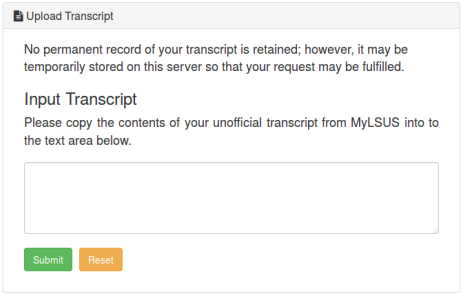


Figure 1.1: Before you can process a transcript, you must first upload it.

To upload the transcript, paste your *Unofficial Transcript* in the text box. Note, the text box is expandable in web browsers for ease of access. (Figure 1.1).


Figure 1.2: Once a transcript is uploaded, a warning will pop up to let you know how your transcript is being used.

### 1.2.2 Select Curriculum

Once you have copied and pasted your *Unofficial Transcript* into the text area and submitted the form, the *Select Curriculum* panel will appear (Figure 1.3). You need to select your enrollment information: *Major*, *Concentration* and *Calendar Year*. In case you are not sure which (enrollment) option to select, contact your advisor or consult the LSUS Catalog which is provided on the right-hand side.

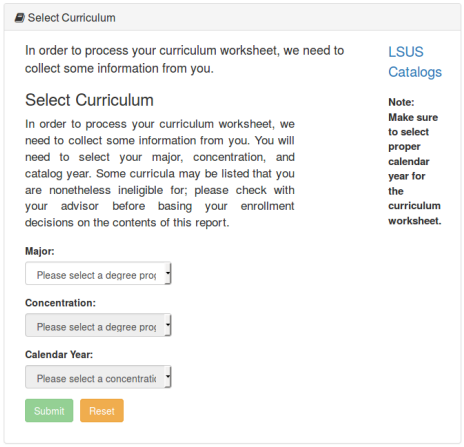


Figure 1.3: A curriculum must be selected before your worksheet can be filled.

### 1.2.3 Worksheet Actions

After you have selected the *Curriculum Worksheet*, the system will now be ready to process your transcript and apply all of your courses to the selected *Curriculum Worksheet* (Figure 1.4). Click the *Submit* button and you will receive an Excel file.

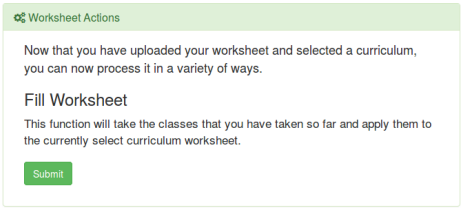


Figure 1.4: With a transcript uploaded and a curriculum selected, you may now operate on your transcript.

## 1.3 Authentication

Although some features of the website can be accessed at any time, some features (such as curriculum management) have restricted access. This section covers the *authentication* process used to grant that access.

### 1.3.1 Logging In

Normally, only a few actions are available to you when you visit the Advisor's Tool. Special actions are available for those who have been assigned accounts by their local administrator. Naturally, access to any option that is available to you when you are not logged in will also be available when you are logged in.

To begin the log-in process, you must have first been assigned an account from an administrator. There is no facility to create a new user account without the intervention of an administrator. Finally, click on the *Log in* button in the top-right corner of the screen. A menu will appear (Figure 1.5).

### 1.3.2 Forgotten Passwords

In the event that your local administrator has issued you an account, but you forgot the password for it, you have two options: contact your local administator to reset the password on your behalf, or request a password reset. This entails a five-step process:

1. Click the *Forgot Password?* link in the authentication. You will be asked to enter your username and email address on record to complete the request.
2. If both the username and email address correspond to your account, an email with a confirmation link will be sent to your email address on record. Click on the link in question.
3. Another email will be sent to your email address on record, this time containing a temporary password that you must log in with next time.
4. Once you log in, you will be asked to change your password. You may not proceed until you have done so.

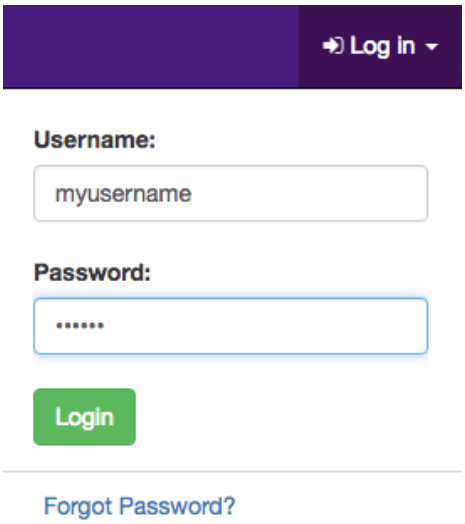


Figure 1.5: The log-in menu is accessed as a drop-down menu.

This process exists to reduce the likelihood that someone may gain control of your account or disable it for you. The first two steps are to ensure that you are aware whenever somebody (even yourself) has initiatiated a request to change your password. If you did not explicitly request this, you may freely ignore it as it will expire in one hour from the time of request. If you do not feel comfortable waiting for the hour to expire, you may also explicitly cancel the request via the link provided in the email.

Great effort was made to ensure that the first two stages of the system were secure so that only you can confirm it; for instance, a hacker has odds of 1 in $2^{320}$ (a number with 97 decimal digits) to correctly guess the information needed to trick the system into erroneously accepting the confirmation. Nonetheless, the chance still exists, so we have added a second layer to ensure that if a hacker does do this, they will not get the chance to pick the new password for the account.

Always pick a password that is complex, but simple enough to remember. The longer a password is, the harder it is to guess. For more information on how to develop a strong password, please see §2.2.1.

# Chapter 2

# Manage Profile

## 2.1 Change Proper Name

The *Change Proper Name* field allows for you to change the human-readable name associated with your worksheet. This may be done for a variety of reasons, such as changing of legal name, mispelling during account creation, and preference for a personal name (e.g., "Joe" instead of "Joseph"). Type in the new name and click the *Change* button.

## 2.2 Change Password

If you would like to change your password, you may use the *Change Password* panel to do so. First, type in your old password. This is necessary to ensure that the person authenticating the password change is you. If you cannot remember your old password, you may log out and use the *Forgot Password* function to generate a new one. For more information, please see please see §1.3.2, "Forgotten Passwords".

Next, you should type in your new password and confirm it in the following text field. In order to successfully change your password, both the new password and the confirmation must match. Once you are ready, press the *Change* button. If your old password is correct and both the new and confirmation passwords match, your password will be changed to the new password and an email will be sent to notify you of this change.

If you did not change your password and you have recieved an email stating that it was changed, notify your local administrator immediately. This is a sign that somebody has broken into your account, and this may have happened to others as well.

### 2.2.1 On Password Selection

In order to prevent unauthorized access to your account, it is important to select a strong password. Strong passwords are characterized by high information entropy, which make them difficult to guess by brute force. However, you don't need to know how to calculate a password's information to make a good one. A strong password usually has the following attributes:

- Is at least 8 characters long.
- Contains at least one number or special charater.
- Contains both capital and lower-case characters.
- Is not a word from the dictionary.
- Is easy to remember.

Passwords can be as long as you want them to be (except for empty) and can accept any character. It is important that you are able to remember your password; if you have to write it down to remember it, it is probably not a good candidate for a password. Likewise, do not even write down passwords which you are certain you will remember. If you need to recover your password, please see §1.3.2, "Forgotten Passwords".

If you are mathematically inclined, you may wish to have an objective way of measuring the strength of your own password. One way of doing this is via Shannon entry, which is defined as:

$$H_S(x) = -\sum_{i=1}^{n} \log_2 P(x_i)$$

... which is just a fancy way of saying the sum of the $\log_2$ of the probability for each letter to occur in your proposed password. Passwords with more diversity will have a much higher entropy (measured in bits), and greater entropy will make the password harder to defeat. This can lead to several options for improved password construction:

- Replacing repeated characters with similar symbols, (e.g., "Pas$word" vs. "password")
- Adding punctuation marks to the password (e.g., "password?!" or "pass_word" instead of "password").
- Creating phrases out of many words, (e.g., "Take my password")

Note that the *above* passwords should not be used as they are in this document and therefore violate the dictionary rule; they exist as only as a demonstration of applying these options. You can use any combination of the above rules, but make sure that the combination is easy to remember.

# Chapter 3

# Manage Curriculum

The *Manage Curriculum* view allows a user to create and populate degree programs. The Manage Curriciulum view is accessed from the main drop-down menu and is only available to users that have logged in.

To *Manage Curriculum*, click on the drop-down menu in the top right-hand corner and select *Manage Curriculum*. Select a program and click *Submit Query* to begin managing the curriculum for your respective degree program. Select a concentration and click *Submit Query* or add a new concentration if the concentration does not exist. You may also remove a concentration, but note that the process is irreversible.

## 3.1 Program Management

The Program Management utility gives the user the ability to select a program for additional actions, add a new program, or to remove a program (Figure 3.1).

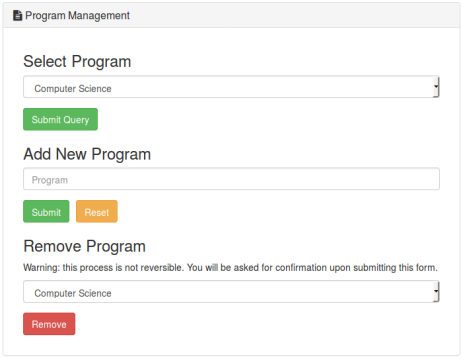


Figure 3.1: The Program Management panel provides basic operations on degree programs.

### 3.1.1 Select Program

To select a program, click on the first drop-down bar and select the appropriate program and click *Submit Query*.

### 3.1.2 Add New Program

If you are a superuser, you may use this option to add a new degree program. You must enter a unique name for the program; afterward, the degree program can be created by clicking the *Submit* button. If successful, the new degree program should show up in the drop-down bar when selecting a program.

If your program does not exist, add a new program by entering the program in the text box and click *Submit*.

### 3.1.3 Remove Program

To remove a program, select the program you want to remove from the drop-down bar and click *Remove*. You will be asked to confirm this removal as the removal process is irreversible. Be extremely careful when removing programs as all curriculum information including rules will be removed permanently. Do not rely on the backup as it may not always be up to date.

## 3.2 Program Administration

Program administrators have the option to set several special settings associated with the the program. In order to utilize the *Program Administration* panel, the user must have the Administrator role for that program or be a super-user. The Program Administration panel appears only when a program has been selected (Figure 3.2).

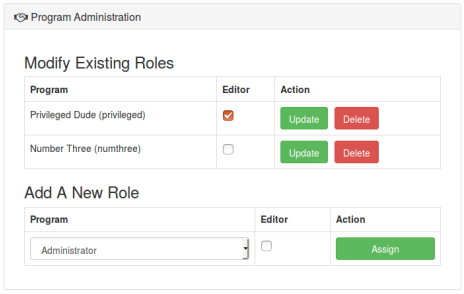


Figure 3.2: The Program Administration panel allows for program administrators to control access by other users.

### 3.2.1 Add A New Role

This function allows an administrator to explicitly add the seleted user to a role related to the selected program. To give a user editing permissions, make sure the box under the *Editor* column is checked and click the *Assign* button.

### 3.2.2 Modify Existing Roles

This function allows an administrator to change the permissions of a user already assigned a role to the selected program or to remove one from the list of assigned roles. The permissions (with the exception of whether or not the user is an administrator) may be set and modified with the *Update* button. By clicking the *Remove* button next to the name of the user, the role will be removed entirely. You may only remove roles which are not associated with a program administrator.

## 3.3 Concentration Management

The Concentration Management utility allows the user to select, add, and remove concentrations. To add a (Figure 3.3).

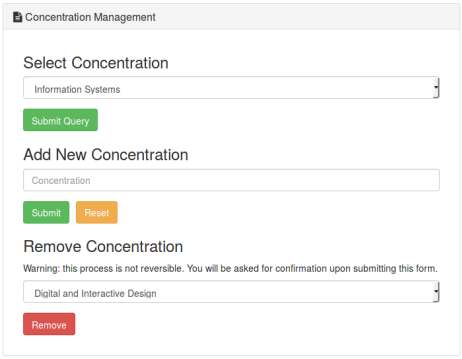


Figure 3.3: The Concentration Management panel provides a mechanism for managing the concentrations associated with a program.

### 3.3.1 Select Concentration

To select a concentration, click on the drop-down bar and select the appropriate concentration and click *Submit Query*.

### 3.3.2 Add New Concentration

If your concentration does not exist, add a new concentration by entering the name of the concentration in the text box located in the Concentration Man-

agement panel. You will also be prompted to add a *Shorthand* name for the concentration. Click *Submit* to proceed. After the concentration has been added, you will be prompted to add a New Worksheet. Please see Worksheet Management (Section 3.4) for more information.

### 3.3.3 Remove Concentration

To remove a concentration, select the concentration you want to remove from the drop-down bar in the Concentration Management panel and click *Remove*. You will be asked to confirm this removal as the removal process is irreversible. Be extremely careful when removing concentration as all concentration information including rules will be removed permanently. Do not rely on the backup as it may not always be up to date.

## 3.4 Worksheet Management

Once a concentration has been selected, it becomes possible to select a curriculum worksheet under that curriculum. The *Worksheet Management* panel allows already existing worksheets to be selected for editing, a new worksheet to be added, or a current worksheet to removed (Figure 3.4).

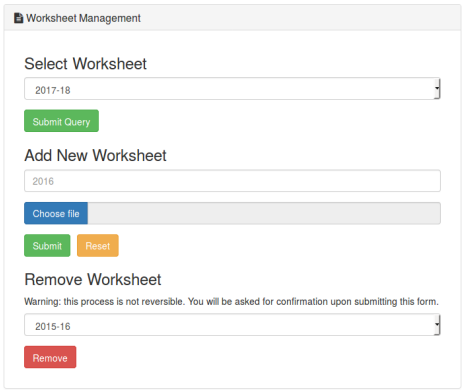


Figure 3.4: The Worksheet Management panel allows for a curriculum's worksheets to be managed.

### 3.4.1 Select Worksheet

For a selected *Program* and *Concentration*, all worksheets are going to be listed in the dropdown list. Each worksheet will be represented by year (2015-16, 2016-17, etc.). In order to manage specific *Worksheets*, the user needs to select a *Year* for a particular worksheet and click the *Submit* button.

### 3.4.2 Add New Worksheet

To add a new *Worksheet*, a user needs to fill out the textfield that represents the *Year*, in a format like: 2016, 2017, etc. Secondly, a file needs to be uploaded. Accepted formats are: XML, XLSX and XLS. Finally, submit the form by clicking the *Submit* button.

### 3.4.3 Remove Worksheet

In order to remove a *Worksheet*, a user needs to select a specific worksheet based on the *Year* (2015-16, 2016-17 etc.), in the dropdown list, and click the *Remove* button.

## 3.5 Rules Management

The *Rules Management* panel allows for the rules that are associated with a worksheet to be entered (Figure 3.5). In addition to being able to pull the worksheet's assets, you may also use this panel to modify or remove existing rules, add new ones, or overwrite them with a rules file.

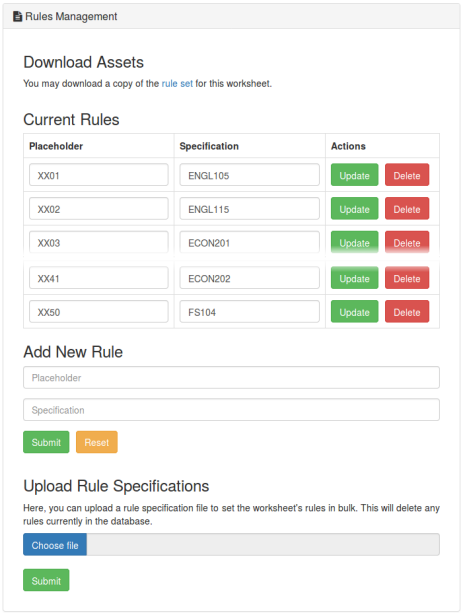


Figure 3.5: The Rules Management panel allows for a worksheet's rules to be specified.

### 3.5.1 Download Assets

There is an option to download the rules file. The link can be found below the *Download Assets* header.

### 3.5.2 Current Rules

All of the rules for specific worksheets are listed within the table. A user has an option to either *Update* or *Delete* a rule. In order to *Update* a rule, the *Placeholder* or *Specification* field needs to be changed. In order to *Delete* a rule, clik the *Delete* button next to rule you intend to delete.

### 3.5.3 Add New Rule

To add a new *Rule*, there are two fields that need to be fulfilled: *Placeholder* and *Specification*. The final step is to click the *Submit* button to submit a form.

### 3.5.4 Upload Rule Specifications

If a user decides to upload the *Rules* file instead of adding each rule individually using the *Add New Rule* form, all he or she needs to do is to upload a file by clicking the *Choose file* button and submitting the form by clicking the *Submit* button.

# Chapter 4

# Manage Site

The *Manage Site* view allows administrators to perform various tasks related to the management of the site. Unless you are an administrator, this chapter will probably not be of interest to you. If you are, please continue reading.

## 4.1 Backup Services

Part of any good maintenance routine is to regularly perform system backups (Figure 4.1). You should regularly perform system backups so that if anything goes wrong, you can reduce the time needed to restore service to your users. For more information on the actual structure of backup files, please see Appendix B, "Backup File Format".

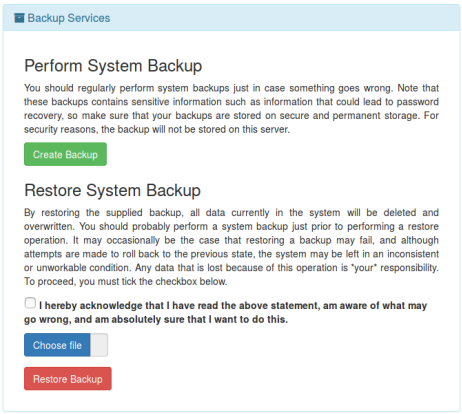


Figure 4.1: The Backup Services panel allows for the system to be backed up and restored.

### 4.1.1 Perform System Backup

To initiate a backup, simply click the *Create Backup* button in the *Backup Services* Panel. This will create and download a backup file as described in Appendix B. You can later restore the backup using the method described in §4.1.2.

Note that the backup file contains some sensitive information and care should be taken to ensure that it is stored on secure, permanent storage. Notably, the salted hashes associated with the password system are stored in this file. Direct password recovery with this method is thought to be computationally infeasible at the time of writing, and the password system is designed to reduce the likelihood that collisions can be discovered either through brute force or through pre-image attacks. Nonetheless, you should still guard your backups as though they do contain actual passwords.

### 4.1.2 Restore System Backup

By using the *Restore System Backup* command, it is possible to revert the system state to one mirroring the backup file that you have uploaded. You must supply a backup file and also tick a confirmation checkbox in order to do so. When you have done both, click the *Restore Backup* button. The previous system state will be lost and the state captured by the backup file will replace it.

Restoring backups can be dangerous because any actions taken after the backup was captured will be lost. Although the developers have taken measures to minimize the possibility of an incomplete backup restoration, the possibility still exists that the rollback process may fail and that the system will be left in an inconsistent or unusable state. Even if the restoration succeeds, you may wish to revert a backup restoration. Because of this, you should usually back up the system just prior to restoring a backup.

## 4.2 Create New User

In order to create a new user, there is a form that needs to be filled out. The form consists of the fields: *Name*, *Email*, *Username* and *Password*. All fields are mandatory and the administrator must fill them out in order to create a new user (Figure 4.2).

## 4.3 Select User to Manage

In order to manage information about a specific user, the administrator needs to select a *User* from a dropdown list and click the *Submit* button (Figure 4.3).

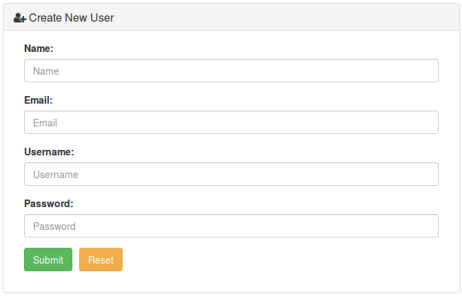


Figure 4.2: The Create New User panel allows for new logins to be created.


Figure 4.3: The Select User on the Manage panel allows for a user to be selected for administration.

## 4.4 Assign New Roles

Assigning new roles can be dangerous, and unintentional changes can be made easily. The administrator should be very careful with this functionality. (Figure 4.4). To assign a new role to a user, there are four cases to be considered:

- Selecting the *Program* name and clicking the *Submit* button. This will assign a new role to a user, but they will still not have *Privileges* for modifying that specific *Program*.

- Selecting the *Program* name, *Admin* privileges and clicking the *Submit* button. This will add a new role to a user and it will assign *Admin* privileges for manipulation of that particular program.

- Selecting *Program* name, *Editor* privileges and clicking the *Submit* button. This will add a new role to a user and it will assign *Editor* privileges for manipulation of that particular program.

- Selecting *Program* name, *Admin* and *Editor* privileges, and clicking the *Submit* button. This will add a new role to a user and it will assign *Admin* and *Editor* privileges for manipulation of that particular program.

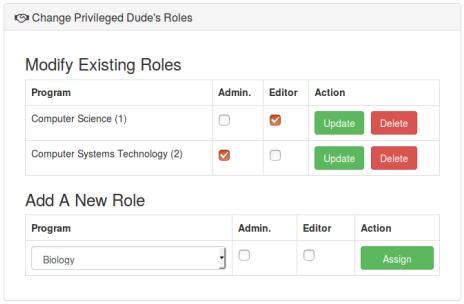


Figure 4.4: The Change User Roles allows for a user's permissions to be set.

## 4.5 Modify Existing Roles

The rule for assigning new roles also applies for modifying roles. The administrator should be very careful when modifying existing roles. There are two options when it comes to modifying a specific role: the administrator can either *Update* or *Delete* roles. To *Delete* a role, click the *Delete* button. To update a role, it is important to make sure that checkboxes are appropriately check or unchecked based on the administrator's decisions.

## 4.6 Change User Information

### 4.6.1 Change Proper Name

To change the proper name, click on the drop-down menu in the upper right-hand corner and click on the *Manage Site* option. Scroll to the bottom and select the user you would like to manage. Click the *Submit Query* button. Scroll to the *Change Proper Name* section and enter the new proper name in the *Name* text box. Click the *Change* button to confirm the change.

Note, the user can also change their proper name on the *Manage Profile* page.

### 4.6.2 Change Username

To change the username, click on the drop-down menu in the upper right-hand corner and click on the *Manage Site* option. Scroll to the bottom and select the user you would like to manage. Click the *Submit Query* button. Scroll to the *Change Username* section. Enter the new username in the *New Username* text box and click the *Change* button to confirm the change.

### 4.6.3 Change Password

To change the password, click on the drop-down menu in the upper right-hand corner and click on the *Manage Site* option. Scroll to the bottom and select the

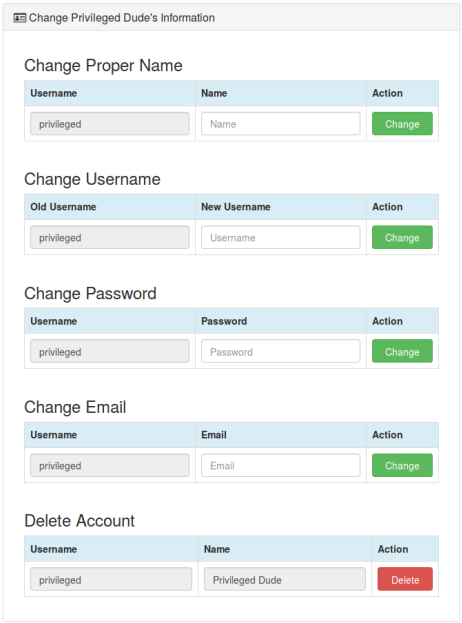


Figure 4.5: The Change User Information panel allows for the user's basic information to be modified.

user you would like to manage. Click the *Submit Query* button. Scroll to the *Change Password* section. Enter the new password in the *Password* text box and click the *Change* button to confirm the change.

The user can also change their password on the *Manage Profile* page.

### 4.6.4 Change Email Address

To change the email address associated with the user's account, click on the drop-down menu in the upper right-hand corner and click on the *Manage Site* option. Scroll to the bottom and select the user you would like to manage. Click the *Submit Query* button. Scroll to the *Change Email Address* section. Enter the new email in the *Email* text box and click the *Change* button to confirm the change.

### 4.6.5 Delete Account

To delete the user's account, click on the drop-down menu in the upper right-hand corner, and click on the *Manage Site* option. Scroll to the bottom, and select the user you would like to manage. Click the *Submit Query* button. Scroll to the *Delete Account* section, and click the *Delete* button.

# Appendix A

# Rules File Format

The format for the ruleset file is a very simple text format used to express how courses are filled in a curriculum worksheet.

## A.1 Rule Elements

A rule is constructed of several different elements, the most basic of which is the direct rule (§A.1.1). By combining rule elements, it is possible to *match* one or more courses for a placeholder in the worksheet. Rules are *bound* to the worksheet using bindings (§A.1.5). This allows for the simple specification of which courses may replace a placeholder in a worksheet template.

### A.1.1 Direct Rules

A *direct rule* consists of a course ID and a course number, such as `CSC 435`. This example refers to a course in the *course category* `CSC` with the course number `435`. It is possible to also append other characters to the end of the course number (e.g., `PHYS 251L`), which is treated as a distinct course.

### A.1.2 Relational Rules

A *relational rule* is a direct rule with a relational operator prefixed to it, such as `>= CSC 435`. This rule refers to any course in the course category `CSC` with a course number that is at least 435. Other relational operators exist (Table A.1).

### A.1.3 Plus Rules

A *plus rule* is a Direct rule which has the '+' character appended to it, such as `CSC 400+`. This example refers to any course in the course categoy `CSC` and with a course number that is at least 400. This form is synonymous with `>= CSC 400`.

| Operator | Description |
|---|---|
| > | Greater than. |
| >= | Greater than or equal (at least). |
| < | Less than. |
| <= | Less than or equal (at most). |

Table A.1: Operators associated with relational rules.

### A.1.4 Alternation

An alternation rule connects two rules with a vertical bar, such as `BIOS 120 | PHYS 261`. This rule means that either `BIOS 120` or `PHYS 261` will be accepted in this rule. It is possible to chain several alternation rules together to create a large set of classes that will be accepted, and any direct, relational, plus, wildcard, or indirect rule may be connected in this fashion.

### A.1.5 Rule Bindings

A rule is bound to a name of the placeholder, followed by a colon (':') and the specification for the rule itself. The placeholder name is "XX" concatenated with a number of at least two decimal digits. For instance, the following is an example of a rule binding:

XX01: BIOS 120 | PHYS 261

This means that a placeholder by the name `XX01` can either be replaced by BIOS 120 or PHYS 261. Note that in the worksheet, an additional digit corresponding to the facet of this placeholder will be appended. These facets are defined in Table A.2. Thus, the name `XX010` means the name of the course that matches the placeholder in associated with `XX01`.

| Facet | Description |
|---|---|
| 0 | The name of the course (e.g., BIOS 120). |
| 1 | The number of credit hours provided by the course. |
| 2 | The semester in which the course was taken. |
| 3 | The number of credit hours actually completed. |
| 4 | The final grade for the course. |

Table A.2: Facets associated with a placeholder name.

### A.1.6 Indirect Rules

An indirect rule takes the form of a dollar sign ('$') followed by a placeholder name. An indirect rule substitutes the definition of the referenced placeholder name into the current name. Thus, `$XX01` is a placeholder referencing the rule `XX01`, and anything that would match $XX01 would also match this indirect rule.

## A.2 Formal Grammar

Below, you will find the grammar for the Rule file language.

```
ruleset := (<rule> | <comment>)*

comment := '#' [^\n]*? "\n"

rule := <rule-name> ':' <grade-bound>? <or-rule>
course := <course-category> <course-number>
          (<course-suffix> | '+')?
course-rule := <rule-relation>? <course>
indirect-rule := '$' <rule-name>
wildcard-rule := [^*]? '*' [^*]?
primary-rule := <course-rule> | <indirect-rule> | wildcard-rule
or-rule := <primary-rule> ( '|' <primary-rule>)*
grade-bound := '[' grade ']'
```

# Appendix B

# Backup File Format

A backup file is simply a ZIP archive with several special files associated with it. The file that you recieve from a backup is complete and under certain circumstances will not require any correction unless it is corrupt. However, if you need to repair a backup file, or if you would like to merge two backup files together, or if you'd like to automate your initial install, this section may be handy to review.

## B.1 Required Entries

While your backup file may consist of anything, there are several entries that Advisor's Tool expects to be in the backup file. These entries must also be in the format specified by its corresponding subsection.

Many of the entries in a backup are specified as *tab-delimited* files. These files are just like CSV files (RFC 4180), except that the tab stop character ("\t", ASCII 0x09) is used as the delimiter. All files are assumed to be ASCII encoded unless otherwise specified. The empty string is usually interpreted as "null" when reading this data.

You may also see the phrase *foreign key* used, as in "$x$ is a foreign key into $z$ of $y$". This means that some field $x$ must correspond to field $z$ in table $y$.

### B.1.1 `manifest.txt`

This file provides various metadata to the backup management system. It uses a key-value pair format where pair is on a separate line. The following is an example of `manifest.txt`'s contents:

```
MANIFEST 0.0.1
Version: 0.0.1
Creator: root
Created: 2017-09-20 05:09:27 CDT
```

The first line *must* be `MANIFEST` (followed by the manifest version), as this is what the backup management system uses to determine that the file is actually a manifest. The Manifest line must be followed by Every line thereafter may be a blank line, a comment beginning with a number sign ("#"), or a name and a value separated by a colon (":"). Keys may be any string not containing a colon, carriage return, or line feed, but keys that have special meaning to the backup system are listed in Table B.1.

| Key | Description |
|---|---|
| `Version` | The version of the software that created this. |
| `Creator` | The user who created this backup. |
| `Created` | When this backup was created. |

Table B.1: Manifest keys used by the backup system.

### B.1.2 `users.tab`

This file is tab-delimited and contains a table of users in the system. This contains data including the user ID, the user's handle, the user's proper name, their email, their credentials, and their flags. A typical `users.tab` looks like this:

| ID | Handle | Name | Email | Salt | Hash | Flags |
|---|---|---|---|---|---|---|
| 1 | root | Admin | | ... | ... | 2 |
| 2 | gary | Gary | g@m.org | ... | ... | 1 |
| 3 | mary | Mary | m@m.org | ... | ... | 0 |
| 5 | larry | Larry | l@m.org | ... | ... | 3 |

In this case, the salt and hash have been omitted for brevity. There are four users: root, gary, mary, and larry. These are idenitified by IDs 1, 2, 3, and 5 respectively. A user corresponding to ID "4" may have existed at one time; however, it has been deleted. The root user does not have an email address. The bits in the `Flags` field can be interpreted via Table B.2. Thus, root is a superuser, gary may not log in, and larry is a superuser who may not log in.

| Bit | Name | Description |
|---|---|---|
| 0x01 | `DISABLED` | This user may not log in. |
| 0x02 | `SUPERUSER` | This user is a site administrator. |
| 0x04 | `TMP_PASS` | This user's password is temporary. |

Table B.2: Bit definitions for the Flags vector in `users.tab`.

### B.1.3 `curriculum/programs.tab`

This file is tab-delimited and contains a table of degree programs in the system. This contains the program ID and the proper name of the program. A typical

`programs.tab` looks like this:

| ID | Name |
|---|---|
| 1 | Computer Science |
| 2 | Biology |
| 3 | English |

Here, there are three departments: Computer Science, Biology, and English. Their corresponding program IDs are 1, 2, and 3 respectively.

### B.1.4 `curriculum/roles.tab`

This file is tab-delimited and contains a table of role mappings in the system. This contains data including the user ID, the program ID, and permissions assigned to the role. The combination {ProgID,UserID} must be unique. A typical `roles.tab` looks like this:

| ProgID | UserID | Flags |
|---|---|---|
| 1 | 2 | 3 |
| 2 | 3 | 2 |
| 2 | 5 | 1 |
| 3 | 5 | 0 |

ProgID and UserID are foreign keys into the ID fields of `users.tab` and `curriculum/programs.tab` respectively. Here, there are four roles defined. The bits in the `Flags` field can be interpreted via Table B.3. Using §B.1.2 and §B.1.3 as examples, this means that Gary is both an administrator and editor of Computer Science, Mary is an administrator for Biology, and Larry is an editor for Biology. Larry is also associated with English, but has no permissions associated with it.

| Bit | Name | Description |
|---|---|---|
| 0x01 | `EDITOR` | This user may edit the program. |
| 0x02 | `ADMINISTRATOR` | This user can administrate the program. |

Table B.3: Bit definitions for the Flags vector in `roles.tab`.

### B.1.5 `curriculum/concentrations.tab`

This file is tab-delimited and contains a table of concentrations in the system. This contains the concentration ID, the program it is associated with, its shorthand, and it's proper name. A typical `programs.tab` looks like this:

| ID | ProgID | Shorthand | Name |
|---|---|---|---|
| 1 | 1 | CS | Computer Science |
| 2 | 1 | NS | Network Security |
| 3 | 2 | ECO | Ecology |
| 4 | 2 | CELL | Cellular Biology |
| 5 | 2 | PMED | Pre–Med |

ProgID is a foreign key into the ID field of `programs.tab`. There are five concentrations in total in this example. According to the values in `programs.tab`, there are two concentrations for Computer Science and three for Biology.

### B.1.6 `curriculum/formats.tab`

This file is tab-delimited and contains a table of worksheet formats in the system. This contains the program ID and the proper name of the program. A typical `programs.tab` looks like this:

```
ID      Name      MIMEType
1       Excel 2007      application/vnd.openxmlformats-...
2       Excel     application/vnd.ms-excel
```

The MIME types are truncated for brevity. There are two formats: Excel 2007 and Excel respectively.

### B.1.7 `curriculum/worksheets.tab`

This file is tab-delimited and contains a table of worksheets in the system. This contains the program ID and the proper name of the program. A typical `programs.tab` looks like this:

| ID | ConcID | Year | Format |
|---|---|---|---|
| 1 | 1 | 2016 | 1 |
| 2 | 1 | 2017 | 1 |
| 3 | 1 | 2015 | 1 |
| 4 | 2 | 2017 | 1 |
| 5 | 2 | 2016 | 1 |

ConcID is a foreign key into the ID field of `concentrations.tab`. Here, there are five worksheets in total. According to the values in §B.1.5, there are three Computer Science worksheets and two belonging to Biology. All of them correspond to the Excel 2007 format according to §B.1.6.

### B.1.8 `curriculum/rules.tab`

This file is tab-delimited and contains a table of degree programs in the system. This file contains the `programs.tab` looks like this:

```
SheetID  Name     Definition
1        XX01     [C] MATH 101
2        XX02     BIOS 120 | PHYS 120
2        XX03     ENGL 105
```

Here, SheetID is a foreign key into the ID field of `worksheet.tab`. The combination {SheetID, Name} must be unique. In this example, there are three rules.

### B.1.9 `curriculum/worksheets/`

The MIME This directory contains the worksheet templates identifier by their worksheet ID, which is a foreign key into the ID field of `worksheet.tab`. The files in this directory are in the format specified by the MIMEType field of their corresponding entry in `worksheets.tab`.