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Program Assessment System

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Today’s world is experiencing constant and rapid change in all areas of life. Progress and technology are the catalysts for the change, and the result is a continuous turnover of knowledge. It is essential for educational institutions to keep pace with the changes in order to turn out students that meet local and national employment requirements. Educational institutions are in need of an assessment system to measure the ongoing effectiveness of disciplines, curricula, programs and courses.

The assessment system will provide the tools to develop, implement, manage, maintain and evaluate the efficiencies of educational programs. The input will include past program requirements, national industry employment expectations, accreditation standards, model curriculum recommendations and student assessment/validation. The output will generate degree programs that keep up with change, validate the transfer of knowledge, meet accreditation standards, follow model curriculum guidelines and are consistent with current employment requirements.

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Introduction

Today’s world is experiencing constant and rapid change in all areas of life. Progress and technology are the catalysts for the change, and the result is a continuous turnover of knowledge. It is essential for educational institutions to keep pace with the changes in order to turn out students that meet local and national employment requirements. Educational institutions are in need of an assessment system to measure the ongoing effectiveness of disciplines, curricula, programs and courses.

The assessment system will provide the tools to develop, implement, manage, maintain and evaluate the efficiencies of educational programs. The input will include past program requirements, national industry employment expectations, accreditation standards, model curriculum recommendations and student assessment/validation. The output will generate degree programs that keep up with change, validate the transfer of knowledge, meet accreditation standards, follow model curriculum guidelines and are consistent with current employment requirements.

The foundation of the system includes, but is not limited to, curriculum theory and practice. The basic definition of curriculum refers to planned and guided learning. The desired learning is planned in advance and the “how to” steps are outlined. The outline bridges the relationship between educational programs and the contours of society. Curricula are intended to blend teaching strategies, learning techniques, real word ideals and influences, and provide a roadmap for learning that focuses on skills and knowledge.

The core organization of the system revolves around curriculum planning. The system accommodates model curriculum and local curriculum development. Model curricula are research-based guidelines and recommendations that have been deemed valuable by an external body/agency at a national level. They recommend objectives and activities that, when implemented, will result in high-quality degree programs, including suggested course groupings and learning goals. Local curriculum development uses model curricula as a guide to develop university specific degree programs, course objectives and learning goals.

Local curriculum development should also consider industry employment needs. The system includes a portal/container to gather and house national industry employment requirements. The employment requirements, for any given discipline, will be discipline specific and focus on a particular subject matter. The required job skills can be linked to learning goals for a specific course within a particular curriculum.

The system provides a program validation process that measures the transfer of knowledge and the employment readiness of the students. The process determines if the current degree programs are meeting their intended goals and the needs of employers. The evaluation/validation process is implemented by administrating exams that contain questions based on learning objectives and exit skills. The questions will be grouped by learning goals. The learning goals represent the academic objectives for a given discipline, program, or course. The exit skills are based on entry level job skills for a particular discipline and will be linked to specific employment requirements.
Bloom Taxonomy levels are used to represent and classify educational objectives. The levels are hierarchical in nature; learning at a higher level is dependent on the knowledge obtained at lower levels. The system uses this taxonomy to provide a process for assessing the outcomes of educational practice and to help teachers prepare and measure learning objectives.

While bloom levels have stood the test of time, some educators felt the need to divide and group them differently. The assessment system offers the flexibility to accommodate this type of subdivision. The system uses a bloom level, depth of knowledge pairing. This assignment results in an informative action that gives bloom level history to the depth of knowledge level. This association can also be linked to activities and objectives which expands the scope of the bloom level.

Depth of knowledge levels (DOK) are used to show the progression, the depth of thinking required and the thoroughness of what is being taught and learned. DOK assignments are a unique model curriculum, bloom level, ordered pairing that represents complexity rather than difficulty. The levels are intended to set standards for students, promote achievement and illustrate the depth-and-breadth of the assigned curriculum.

Spiral learning is used to strengthen the understanding of concepts. The idea uses repetition and gradually increasing difficulty throughout the curriculum. The program assessment system implements this concept by creating groups of learning goals whose names differ only by a DOK level, but have unique descriptions reflecting the change in level. This mimics spiral learning by revisiting basic topics at successive higher levels, thereby progressing to a full understanding. By making the spiral learning visible, it is easier to construct logical courses, course orderings and to define prerequisite courses.

Model curricula are defined and developed by a professional society. The society groups consist of educational faculty and industry representatives, at a national level. The society collaborates to outline a road map for quality degree programs. They receive feedback via national and international conferences and publications which, in turn, results in curriculum revisions. They suggest logical courses, their learning orders, learning goals and logical course learning unit goal assignments. The application allows for the model curriculum details to be entered into the system. It can capture model curriculum suggested logical courses, course learning orders, learning objectives, learning goals, depth of knowledge objectives and depth of knowledge activities.

The software facilitates the inclusion of past curriculum efforts when creating future curricula. A cloning feature allows for the creation of curriculum replicas: courses, learning objective and goals. The reproduction can be modified and tweaked as needed. The cloning functionality will be particularly useful for curricula that require frequent updating to remain effective.

Educational accreditation is a quality assurance practice to determine if educational programs are meeting national standards and “doing what they say they are doing.” The standards are set by an external body/agency whose membership consists of faculty from accredited/candidate programs. Accrediting bodies provide a framework for curriculum requirements. The requirements are often a higher level abstraction of an accepted model curricula. The application allows for the details of accreditation standards to be entered into the system. It also provides the opportunity to align local degree program standards with accreditation standards. The general assumption is that if an institution implements a model curriculum, they will more than likely exceed curriculum requirements for their specific program accreditation.
Objectives

The main focus of this project was to design and implement the database framework, flush out and fine-tune data requirements and define the database relationships for the program/curriculum administration segment of the program assessment system. The secondary purpose was to develop and implement a web-based user interface prototype to evaluate the database design.

Development Style and Scope

“Rapid Prototyping” was the prototype methodology used to bring the database to life. The process was informal with the most important factor being the speed which the prototype was created. This methodology is also referred to as throwaway, or closed-ended, prototyping. This style of prototyping refers to the creation of a GUI application that may ultimately be discarded. The resulting web-based application may or may not be the starting point from which a more formal development phase can continue.

Scope Limitations

The prototype is considered a functional prototype also known as a working prototype. It is intended to simulate the functionality of the intended design on a practical level. This prototype is a simple, working model that was constructed to visually show the end users what the requirements look like when implemented.

This prototype did not consider the following:

- Browser Independence
- GUI Design Considerations
- Error Handling
- Data Validation
- Database Optimization
- Object Oriented Classes or Code Organization
- Application Security

Assumptions

The data entered into the prototype must be entered in the correct format and in the expected order. Due to time limitations the purpose and focus of the prototype was to validate the database and the functionally of the stored procedures. Error handling and data validation are minimal.

General Knowledge Gain and/or Reinforcement

I have been a software engineer for over twelve years and have been part of countless projects. I can honestly say I have learned something from every project. Whether it was new or relearned information, it was all acquired knowledge. This statement holds true for the Program Assessment project as well.
RAD Development Really Does Work

This I already knew and have witnessed time and time again. I understand and agree the rapid application development (RAD) approach is not appropriate for all projects. This development style was a perfect fit for this phase of the project. This project demonstrated that RAD development not only helps the end user see things more clearly, it also helps the developer. All participants involved were visual learners. The prototype provided a visual that allowed the user to easily communicate design and functionality requirements.

Specifications Are Priceless

In a perfect world, the fundamental idea of a specification is an explicit set of requirements and/or the desired behavior of the software system. They offer details and descriptions of inputs and how the system should respond or process the inputs and outputs. Usually they are considered to be blueprints or user manuals derived from a developer’s point of view. I did have prior knowledge of the importance of specification, and this project reinforced that in every possible way.

I realize this collaboration effort is unique and is a voluntary endeavor. The participants involved have and will phase in and out every four months. I am also aware that the individuals involved have different skill levels and different development styles. To complicate matters even more, the passing from one phase to another provides no communication between individuals involved. These situations typically do not reflect reality, but in this case it was the perfect recipe for incomplete specification.

Due to the unavoidable conditions mentioned above, in the previous phases of this project, the specifications we began with were incomplete. They did outline programs, courses, and learning goals but offered no information regarding bloom levels, depth of knowledge assignments, learning objectives, model curriculums, accreditation, accreditations standards, or program objectives. I relearned it is a lot of effort, but necessary, to add, remove or modify a column in a table after the web page, stored procedures and/or GUI objects are in place.

I also learned something new. For the first time I saw how incomplete specifications can and will alter the project time line and defined tasks. Either I have never had incomplete specs before, or I never paid attention to the timeline.

Project Management

I never want to be a project manager. Project planning can and will be off when using incomplete specifications to create timelines and tasks. The project proposal was adjusted and readjusted as requirements were added and redefined. In turn, new tasks were added, and timelines were adjusted and readjusted. It occurred to me that is the reason why project managers are always asking for updated specifications and time estimates.

Communication and Face To Face Meetings are Indispensable

This I already knew but was amazed how every face-to-face meeting made things more understandable for both parties involved. When my thoughts and ideas were off, the meetings got me back on track and shed more light on the subject at hand. Occasionally the meetings drew out undiscovered requirements and redefined existing ones. The discussions and explanations that occurred would not have been the same if they occurred over the phone or via email. I can easily understand how this could be a major contributing factor to the failure of off shoring development efforts.
Database Classes Are Absolute Necessary

The knowledge gained for the three database classes really came into play. This phase of the project required database fundamentals; normalization, relationships and entity relationship diagrams. The more advance topics, indexing, tuning and query optimization, will take place as the application matures and becomes more stable.

I work with many different developers from many different companies and I am amazed by programmers that have little to no database training. It happens more than it should. Database fundamentals and programming go hand in hand. This pairing of knowledge should be required by anyone involved in database-driven applications.

Specific Items Learned

- How to call a stored procedure from another stored procedure
  Exec
- How to return the freshly created ID after an insert - return the auto number as an output parameter. Most of the insert stored procedures contain this logic.
  @intNewID OUTPUT
  SET @intNewID = Scope_Identity()
- How to control choices in a combo box (1,2,3,4,5,6, … ) choices allowed only 1 per group
  BloomAdmin.aspx
  ModelCurriculumDepthOfKnowledge.aspx
  ProgramStandards.aspx
  AccreditationStandards.aspx
- SelectNewRow () – This routine loops through a data grid and selects the newly created row. SET @intNewID = Scope_Identity() is returned then selected in the datagrid.
- Use of Master Pages and Content Place Holders
  LoginMaster.master
  AdminMaster.master
  UserMaster.master
- Implemented two Java messages
  Are you sure you want to delete this row?
  Due to foreign key constraints this row can not be deleted.
- How to cancel a delete for RI reasons
  e.cancel
- How to create an index table on a word document.
  This document

Deliverables

The project deliverables include the following:

- Entity Relationship Diagram
- Physical Database Model
- Physical Database
  - Tables (20)
  - Relationships
  - Stored Procedures (138)
- Prototype
Prototype Navigation

The prototype offers three master pages. Each master page has a unique menu selection and can be used to organize the website by user functionality. When a user logs into the system they are redirected to the appropriate master page based on their assigned security level.

- AdminMaster – the container for the maintenance forms menu.
- UserMaster – the container for the administration and assignment forms menu.
- LoginMaster – used to let authorized users into the system, no menu selection offered.

Prototype Functionality Details

The web pages were designed to be intuitive and self explanatory. They have similar functionality and a similar look and feel. The individual pages contain data from different tables in the database, but the framework and structure remain the same. When possible, the controls are located in the same position and have the same height and width.

The basic web page contains a grid view to display data from the desired database table and textboxes and/or dropdown lists to display the user selected data record. The forms offer the ability to insert, delete and update data records. They also have clear, new and save buttons located below the data to be inserted or modified.

On the left side, a grid view displays all data records from the desired database table. The fields and/or combination of fields visible in the grid view were selected by an expert user. The data in the grid view can be sorted by clicking on a column header; one click for ascending order and a second click for descending order.

When a user selects the select button in a grid view, the data record for the selected row will populate the textboxes and/or dropdown lists on the right side. The user can modify any portion of the data that appears in a control with a white background. Controls with a grey background are read only and cannot be modified.

When a data row is inserted into the database, the current user’s user id and the current date are appended to the row. When a data row is updated, the current user’s user id and the current date are also appended to the row. The created by, modified by, created date and modified date are used for inserts, and the modified by and modified date are used when the record is updated.

Read Only Fields: created by, created date, modified by, modified date. These fields are implemented on all tables in the database. The data for these fields will appear in textboxes with a grey background. These fields are read only and cannot be modified by a user. This information can be used to determine the user that created the original row and the user who last modified the row.

New (Insert) - When the user selects the new button, the textboxes on the right will be cleared. Once the data has been cleared the user can enter new data. After the data has been entered, the user must select the save button to commit the data to the database. After the data has been committed the new data record will automatically be selected in the grid view, and the new data will populate in the proper controls on the right hand side. The data will not be committed to the database unless the save button is clicked.
Save (Update) - Once the data appears in the textboxes and/or dropdown lists, the user can update the data. After the data has been updated, the user must select the save button to commit the data to the database. The data will not be committed to the database unless the save button is clicked.

Clear – When the user selects the clear button, the data in the textboxes and/or dropdown lists on the right will be cleared. No database interaction will take place; the data appearing on the right side will simply be cleared.

Delete - When the user selects a delete button in a grid view, a confirm delete message will appear. The user is required to verify that delete action is desired. Once the delete has been confirmed, the primary key for the selected row will be processed via a stored procedure. The stored procedure will return a count that represents how many instances the selected primary key appears as a foreign key in other tables. If the count = 0, the row will be deleted, and a confirmed delete message will inform the user the delete was successful. If the count > 0, the delete process will be cancelled and a message will inform the user the selected row cannot be deleted.

Maintenance Forms

The basic maintenance forms include the functionality mentioned above. These forms include at least five stored procedures: select, insert, update, delete and a foreign key reference count. The primary keys created by the maintenance forms will be a foreign key referenced in other tables. More than likely the data captured on these forms will be used in a combo box or textbox on another form.

Administration Forms

The administration maintenance forms are slightly more complicated than the basic maintenance forms. They serve a higher purpose than gathering data to populate a combo box. The forms are unique, and each serves a specific purpose. The form name is descriptive and lends itself to the content and purpose of the form.

They include the basic functionality mentioned above. The update, insert and delete functionality work the same as the basic maintenance forms. The forms will more than likely include an assignment, a foreign key reference to one or more tables. Most of these forms gather data for the beginning step of a larger assignment process.

Assignment Forms

The administration assignment forms are slightly more complex than the administration maintenance forms. The forms are unique, and each serves a specific purpose. The form name is descriptive and lends itself to the content and purpose of the form. All of the forms represent at least two tables. They provide the means to link records from different tables and manage the relationships between them.

They include the basic functionality mentioned above. The update, insert and delete functionality work the same as the basic maintenance forms. The form will more than likely include an assignment, a foreign key reference and a one-to-many relationship.
Database Diagram

Model Curriculum Entity Relationship Diagram
Accreditation Standards Entity Relationship Diagram

Employment Skills Requirements Entity Relationship Diagram
Project Check Point

The Assessment System is a true work in progress. It has been an ongoing venture for many years and will continue for many years to come. Until now the work on the system has consisted of research, concepts and theories. This is the first phase to produce a deliverable the user can see, touch and use. It is an exciting phase because construction is under way, and the progress is visible.

The original vision included the following modules: model and local curriculum development, accreditation standards, program standards, national skills requirements, exam containers, exam alignment and reporting. This phase of the project focused on the model curriculum development, accreditation standards and the local program standards portions of the assessment system. These modules are only the beginning.

Summary

Education is a broad concept and has many different definitions. All definitions refer to the process in which students learn. That brings us to the concept of learning. The concept of learning includes acquiring new knowledge, skills, values and understanding. The learning process itself is dynamic in nature, and the techniques for learning have evolved over the years. The process of what should be learned and what is being learned is a process that is somewhat difficult to gauge. Although difficult, it is a process that should be examined more closely and used to advance the practice of education.

The concept of an educational assessment system is an outstanding proposal and the need for such a system has existed for years. The system provides checks and balances that offer the ability to fine-tune the process that transmits accumulated knowledge, skills and ideals from one generation to another. It provides the means necessary to discover what should be learned and what is being learned.

The assessment system outlined in this paper only scratches the surface of the potential a system like this has to offer. The proposed system was designed for higher education institutions at a national level. The systems concepts could be used to meet the needs of primary and secondary educational institutions as well. The framework could be tweaked to include international, as well as national and local influences. This is only the beginning; we have a long way to go.
Program Assessment User Guide

This section outlines preparation details, requirements and the process steps necessary for preparing and using the Program Assessment System to create model curricula, accreditation standards and employment skill requirements. The steps must be executed in the proper order.

Preliminary step

The initial setup step is a preliminary step that allows an administrator into the system to create system users. There is a default user id (Admin) and password (Admin) to allow the initial user into the system. Once the administrator has logged into the system they can add system users and assign the appropriate security level.

Login.aspx

The Login.aspx web page is a basic login form. The page contains functionality that allows users to enter the program assessment system at the assigned security level. Once the user is validated, they are redirected to the appropriate web page based on their assigned security level.

Step One

The first step is creating system users and loading the maintenance data into the proper tables. The data captured on these forms will be used in combo boxes or textboxes on other forms. The security level necessary to gain access to these forms is Admin. The maintenance forms include the flowing web pages; Bloom.aspx, DegreeLevelAdmin.aspx, StatusAdmin.aspx, UserSecurityLevel.aspx and ReferenceAdmin.aspx.

The default data in following forms should not be altered: StatusAdmin.aspx, UserSecurityLevel.aspx. The default data is embedded within the applications logic. If the data is deleted the system may not respond properly.
The UserInformation.aspx web page is a basic maintenance form. The form is used to manage the systems user information.

The required user information includes the following columns: first name, last name, user id, password and security level. The user id and password pairing must be unique. If there is a need for a user to have more than one role, the user id or password must be different. If a duplicate combination is entered into the system, the stored procedure will simply update the existing user id-password pairings security level.

User ids are referenced in every table in the database. When an insert is executed, the user id of the current user is inserted into the created by column and the updated by column. When an update is executed, the updated by column is set to current user id. When a user id is modified, all of the records that reference the user id will reflect the modification.
The BloomAdmin.aspx webpage is a basic maintenance form. The form is used to manage the bloom information.

The user is required to enter a bloom name, bloom description and an order. The order represents a hierarchical pattern; higher orders are dependent on lower orders. The ordering schema is unique, order numbers are only allowed into the bloom table once. The bloom taxonomy data is considered historical and should remain static. Once the data is entered into the system it will not need to be altered.

The form also displays a reference footnote to inform users where the bloom data was obtained. The reference footnote data can be created/deleted/updated on the reference admin form ReferenceAdmin.aspx. This form is currently the only form to use the reference functionality.
The DegreeLevelAdmin.aspx web page is a basic maintenance form. The form is used to manage degree level information. Examples of degree level would be Graduate or Undergraduate.
The StatusAdmin.aspx web page is a basic maintenance form. The form is used to manage status levels. A status reference is used to indicate work flow progression. Examples of status would be In Progress or Completed.
The UserSecurityLevel.aspx web page is a basic maintenance form. The form is used to manage user security levels. An example of a user level would be Admin, Faculty, etc.

The system has two default security levels that should not be deleted (Admin, Faculty). These levels are used to direct users to the proper menu. When a user needs to have both admin and faculty rights two separate user id will need to be created.
The ReferenceAdmin.aspx web page is a basic maintenance form. The form is used to manage reference information. It allows users to create a reference notation for the data that is stored in a local database table. The references can be used as a footnote to inform users where the data on the selected page was obtained.

**Step Two**

The second step includes three processes; model curriculum development, accreditation standards development and employment skill requirements. The first two processes can be done in either order but the third process must occur after the development of a model curriculum.

The model curriculum process has four steps that must be done in the proper order.

1. Create a model curriculum or clone a model curriculum
   ModelCurriculum.aspx
2. Create model curriculum DOK
   ModelCurriculumDepthOfKnowledge.aspx
3. Create learning unit goals
   LearningUnitGoals.aspx
4. Create model curriculum logical courses
   LogicalCourses.aspx
5. Enter logical courses learning goal assignments
   LogicalCourseLearningUnitAssign.aspx
The ModelCurriculum.aspx web page is a basic maintenance form. The form is used to manage model curriculum descriptions. It is implied that the model curriculum description will include the year. Some examples of a model curriculum would be; IS 2003, CS 2005.
The ModelCurriculumDepthOfKnowledge.aspx web page is an assignment maintenance form. The form is used to manage depth of knowledge information and their corresponding activities and objectives.

Users enter a model curriculum, bloom level, depth of knowledge name, a depth of knowledge meaning and an order. This pairing provides the measurability for spiral learning. The form also provides model curriculum-depth of knowledge activity and objective linking functionality. The user selects the desired model curriculum bloom level pairing, and then enters the activities and objectives. The activities and objectives are not correlated.
The LearningUnitGoal.aspx web page is an administrative maintenance form. The form is used to manage learning unit goal information and learning unit objective assignments.

The form requires the user to enter a model curriculum, learning unit name, learning unit goal, a number, and a knowledge depth level. The number is unique to the selected model curriculum, only one number model curriculum is allowed.

The user also has the ability to assign learning unit objectives. The objects are assigned to an order. The order is unique to the learning unit goal; only one per goal is allowed.

The model curriculum goals can be designed to differ only by the DOK assignment. The unique ordering implements the spiral learning concept. User can increase the DOK for higher ordered goals and repeat the same objectives as the lower goal. Spiral learning occurs by revisiting the topics and objectives repeatedly.
The LogicalCourse.aspx web page is a basic assignment form. The form is used to manage logical course information.

The form is used to create and assign logical courses to a curriculum. The user is required to select a model curriculum, course description, learning order, course topic and a course scope. The learning orders that appear in the combo box are learning orders that haven’t been assigned to the selected model curriculum. The ordering schema is unique within a model curriculum; only one number per curriculum is allowed.
The LogicalCourseLearningUnitGoalAssignment.aspx web page is an assignment maintenance form. The form is used to manage course objectives for a course belonging to a specific model curriculum. The page contains basic functionality that allows users to add or remove predefined course objectives.

The accreditation standard process has two steps that must be done in the proper order.

1. Create an Accreditation standard
   AccreditationStandards.aspx
2. Create a Program standard
   ProgramAdmin.aspx
The AccreditationAdmin.aspx web page is a maintenance form. The form is used to manage accreditation information.

The form requires the user to enter an accrediting body description, acronym, year and a status. The user must also indicate how the linked criteria records will be ordered, either by letters or numbers. The status indicates whether the accreditation record is ready for viewing by non-admin members. The in progress status indicates the record is a true work in progress and will block non-admin users from viewing the accreditation standards record. The completed status signifies the accreditation standard has been finished and will allow access to non-admin users.

This form also allows users to clone an existing accreditation standard. When the clone button is clicked, the selected accreditation record is used to create a new accreditation standard. The status of the clone will be set to In Progress and the parent id will be set to the accreditation id of the selected record. The accreditation criteria records assigned to the parent will also be duplicated. All accreditation criteria assigned to the parent will be inserted into the accreditation criteria table with the accreditation id of the newly created clone.

New accreditation standards can also be created on the accreditation standards web page, AccreditationStandards.aspx. This alternate page offers insert, update and delete capabilities. The cloning options is only available on the admin page, AccreditationAdmin.aspx.
The ProgramAdmin.aspx web page is a maintenance form. The form is used to manage program information. Program data records include the following columns: program name, acronym, year, parent id, accrediting body, status and degree level.

The form requires the user to enter a program name, acronym, year, accrediting body, status and a degree level. The status indicates whether the program record is ready for viewing by non-admin members. The in progress status indicates the record is a true work in progress and will block non-admin users from viewing the program record. The completed status signifies the program has been finished and will allow access to non-admin users.

This form also allows users to clone an existing program. When the clone button is clicked, the selected program record is used to create a new program. The status of the clone will be set to In Progress, and the parent id will be set to the program id of the selected record. The program criteria records assigned to the parent will also be duplicated. All program criteria assigned to the parent will be inserted into the program criteria table with the program id of the newly created clone.

New programs can also be created on the program standards web page, ProgramStandards.aspx. This alternate page offers insert, update and delete capabilities. The cloning option is only available on the admin page, ProgramAdmin.aspx.
The AccreditationStandards.aspx web page is an assignment maintenance form. The form is used to manage accreditation criteria and accreditation information and the relationships that exist between them.

The form requires the user to enter an accrediting body description, acronym, year and a status. The user must also indicate how the linked criteria records will be ordered, either by letters or numbers. The status indicates whether the accreditation record is ready for viewing by non-admin members. The in progress status indicates the record is a true work in progress and will block non-admin users from viewing the accreditation standards record. The completed status signifies the accreditation standard has been finished and will allow access to non-admin users.

The form also provides accreditation criteria linking functionality. The user enters accreditation criteria and an order. The assigned, order corresponds to a sequence to be followed. The criteria itself represents the accrediting bodies’ requirements that must be met to receive endorsement.
The ProgramStandard.aspx web page is a assignment maintenance form. The form is used to manage program information. Program data records include the following columns: program name, acronym, year, parent id, accrediting body, status and degree level.

The form requires the user to enter a program name, acronym, year, accrediting body, a status and a degree level. The status indicates whether the program record is ready for viewing by non-admin members. The in progress status indicates the record is a true work in progress and will block non-admin users from viewing the program record. The completed status signifies the program has been finished and will allow access to non-admin users.

The form also provides program criteria linking functionality. The user enters program criteria data and an order. The assigned order corresponds to a sequence to be followed. The criteria itself represents the requirements that must be met by the accrediting body.

The employment skills process is a one step process.

The EmploymentSkills.aspx web page is an assignment maintenance form. The form is used to manage employment skill sets, skills and sub skills information.

The form requires the user to enter a model curriculum, employment skill set and a skill set order. Then the user enters an employment skill name, skill order and a skill definition. The form also provides sub skill linking functionality. The user enters sub skill data and an order. The assigned order corresponds to a sequence to be followed. The sub skills represent the national employment requirements.
Reflections

Thoughts\ideas we learned or uncovered during this development phase:

- Local skill sets are not considered only national skill sets – local skill sets are a great idea.
- International curriculum considerations are not a part of this system, do they need to be?
- An additional module to allow for syllabus development could easily tie into the local curriculum learning goals and objectives.

Notes to Future Developers

- I chose to use long descriptive names – this project will pass through many different programmers, I choose the long descriptive names in hopes to clarify the meaning behind the name.
- The minimum year selection and the year selection ranges are based on the highest year in the table associated with the webpage.
  a. Program Admin – cboYear
  b. Program Admin – cboCloneYear
  c. Program Criteria - cboYear
  d. Accreditation Admin – cboYear
  e. Accreditation Admin – cboCloneYear
  f. Accreditation Criteria – cboYear
- SQL Express is the current DBMS. It was selected because it is a freeware. The express version is scaled down and may or may not be able to provide the necessary speed. If performance issues should arise, as database grows, the DBMS may have to be upgraded to full SQL.
- The following fields are included on all tables in the database: created by, created date, modified by, and modified date. This information can be used to determine which user created the original row and which user last modified the row. When a new table is added to the database, these four fields should be included.
- When adding a new table to the database, the stored procedure (sp_SelectUserCount) will need to be updated to include the new table. This stored procedure counts all user id FK references; both created by and modified by should to be included.
- As the database grows with the system, database optimization should be applied.
- Currently, the delete process includes a stored procedure that returns a count of FK references in other tables. This process could be handled differently. The delete process could catch the error from the stored procedure and display an alert message.
- TableReference.aspx – Currently, the stored procedure that populates the cboTables returns a list of of the tables in the database. If a table is deleted for some reason, the selected row could contain a table name that doesn’t exist any longer, and an error will occur. Applying some logic should be able to resolve this issue.
- If a new table is created, the table name should be prefaced with tbl, i.e., tblTableName.
- Stored procedures naming conventions; sp_ActionTable. An example of stored procedures for the the status table (tblStatus) sp_SelectStatus, sp_InsertStatus, sp_UpdateStatus, sp_SelectStatusCount.
There are two status values in the status table (tblStatus) that are hardcoded when selecting data to display to non-admin users. Programs and accreditations use the status to show a work flow process. The hardcoded values issue may have to be revisited.

The delete rule for the logical course table is set to cascading delete. When a logical course is deleted all objectives assigned to it will also be deleted. Currently this is the only cascading delete set up on the database. This may be something to revisit as the project progresses.

The cloning process for the model curriculum and the local curriculum will require some thought. The model curriculum has many records from different tables linked to it. For example, a model curriculum has courses, and the courses have objectives and goals. Should the clone process use the existing PK id for a course, or should it create a new PK and copy all course data from the existing linked courses?

<table>
<thead>
<tr>
<th>Parent</th>
<th>Clone Option 1</th>
<th>Clone Option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK 1 MC1</td>
<td>PK 2 MC2</td>
<td>PK 2 MC2</td>
</tr>
<tr>
<td>PK 1 Course 1</td>
<td>PK 1 Course 1</td>
<td>PK 10 Course 1</td>
</tr>
<tr>
<td>PK 1 Objective 1</td>
<td>PK 1 Objective 1</td>
<td>PK 14 Objective 1</td>
</tr>
<tr>
<td>PK 2 Objective 2</td>
<td>PK 2 Objective 2</td>
<td>PK 21 Objective 2</td>
</tr>
</tbody>
</table>

If Option 1 is implemented, this scenario could apply: if a user modifies the MC2 Course 1 description, the Course 1 description will also be modified for MC1. This is more than likely unacceptable.

<table>
<thead>
<tr>
<th>Clone Option 1</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK 2 MC2</td>
<td>PK 1 MC1</td>
</tr>
<tr>
<td>PK 1 CS 100</td>
<td>PK 1 CS 100</td>
</tr>
<tr>
<td>PK 1 Objective 1</td>
<td>PK 1 Objective 1</td>
</tr>
<tr>
<td>PK 2 Objective 2</td>
<td>PK 2 Objective 2</td>
</tr>
</tbody>
</table>

The course description could be read only if more than one model curriculum is associated with it. In this case the user would have to remove the course and create a new one.

Changed Bloom level selection and order selection on ModelCurriculumDepthOfKnowledge.aspx. They are not unique to a model curriculum, SelectAvailableOrders changed to SelectOrders and SelectAvailableBloom changed to SelectBloom.
References

- http://homeschooling.families.com/blog/spiral-learning-a-superior-approach
- http://learnweb.harvard.edu/alps/thinking/design_learning_spiral.cfm