

## CSE230 Project 2A – Fall 2006 – Software Analysis

**Due: Friday, Sept. 15, 2006 at 2:00 pm**

To set the context for the laboratory projects for this semester, Part A of Project 2 will introduce the intended application domain. The Home Design and Improvement System, HDIS, is intended to integrate and unify all activities related to construction and improvements of homes. Constructing a new home or renovating an existing home can require a high number of interactions with numerous individuals, companies, and stores. The purpose of HDIS is to utilize computing technology in a positive way to enhance, facilitate, and promote this activity. To do so, there is a requirement for interactions with the following individuals and services:

- Suppliers of construction and improvement goods, e.g., lumber yards, hardware stores, plumbing, electrical, and lighting supply stores, garden centers, flooring and furniture stores, etc.
- Contractors of construction services, e.g., general, electrical, plumbing, paving, foundation, security, landscape, etc.
- Architects for new home and improvement design that includes cost estimation and high-tech display capabilities. In this situation, HDIS may need to be integrated with available software systems that already provide these capabilities.
- Interior designers for lighting, furniture, wallpaper and window treatments, carpets and rugs, other flooring (tile, hardwood), etc.
- Landscape designers for all outside flowers, shrubs, trees, walkways, fences, pools, etc.
- Financial institutions for new home mortgages and home equity/improvement loans. In this case, HDIS will likely interact with commercial systems.
- Home owners to allow them to track all aspects of their project and if desired to function as the general contractor for managing and scheduling all of the construction work.

Some of the previous individuals and services (like architects and financial institutions) will also need to support interactions with existing commercial software.

To support the functional and operational requirements of HDIS, there must be a number of databases that must be present:

- House Plan Database: Contains the blueprints and construction supply lists for thousands of different homes. The construction supply list is helpful in ordering all of the materials that are needed to build or renovate a home. The blueprints are also needed for landscape and lighting designs, which also have associated materials (plants and light fixtures).
- Supplier Databases: These are databases that contain a list of the materials or items that are available (including pricing information) at each of the suppliers. For example, a lumber yard supplier database would contain the different types of dimensional lumber, windows and doors, nailing, roofing materials, etc. This database is essentially the backend of information that would sit behind any of the major e-tailing sites such as: <http://www.lowes.com> and

<http://willards.doitbest.com/DoItBest/home.aspx> for many different types of building materials, <http://www.ctlighting.com/ctlight/> for indoor and outdoor lighting fixtures, and <http://www.syn-marproducts.com/> for countertops, etc.

- **Schedule Database:** Needed to allow the entire project to be tracked, to insure that goods are delivered when needed and contractors work is allocated correctly. For example, on a new home, the plumbers and electricians must finish their work, and have that work be inspected, before the plasters can begin to work on the inside walls. There is a set order to constructing a house after the lot and blueprints have been approved that must be followed, e.g.: clear land, grade land, excavate for the foundation, frame and pour foundation, framing of floors, walls, etc., windows, roofing, siding, rough electrical, rough plumbing, drywall, wall and door molding, painting, flooring, kitchen cabinets, baseboard molding, painting, final electrical, final plumbing, appliances install, etc. This order often changes slightly depending on certain factors.
- **Accounting Database:** Since many homeowners have a construction loan or a home equity loan with a dedicated checkbook, such a database would allow a homeowner to track both incoming (from loans) and outgoing funds. The outgoing funds pay for both goods and services.
- **Contractor/Designer Database:** Contains information on all of the available contractors and designers in a particular area (county or state). This may also have web links to the particular contractor, and also to the various state and local agencies involved in the construction process: <http://www.ct.gov/dcp/site/default.asp> for the CT Department of Consumer Protection which lets you obtain information on contractors and links to individual building departments for each town, e.g., <http://www.mansfieldct.org/town/departments/building/index.php>
- **Financial Database:** Contains information on all of the financial institutions that lend money in a particular area (county or state). The up-to-date interest rates for different loan options would also be stored.

These database are critical for supporting and promoting the sharing and exchange of information among the many individuals that require access to HDIS. Clearly, there is a great deal of interaction among the data in each database. Note also that these are logically describing the information in each repository; the details of some of these databases will be the subject of future project design and development.

All of the previous individuals and services will require specialized user interfaces to handle the information and processing that is required. Some possible interfaces include:

- **Contractor Interface:** Allows a contractor to view house plans and submit bids for the jobs. To do so, this interface will also have to interact with supplier databases so that cost estimation can occur.
- **Architectural Interface:** Allows the house plans to be electronically accessed and viewed. The viewing may occur via another system that is geared towards architectural design. Some emerging systems in this field allow users to walkthrough the house in a simulated three-dimensional mode.
- **Landscape Interface:** Similar to Architectural Interface for landscape design.
- **Schedule, Supplier, and Funding Interfaces:** Separate interfaces to support the: scheduling of goods and services, the access to supplier data including pricing, and an electronic means to submit a loan application.

- Home owner interface: The home owner interface must contain many of the features of all of the different interfaces, particularly for those situations where a homeowner is acting as his/her own general contractor. This interface would have web links to various sites of interest (building materials, financial institutions, etc.) to allow the home owner to manage all aspects of the construction process.

Remember, this is not an exhaustive list of all user interfaces for HDIS. Over the course of the semester, this information will be augmented and extended with different project requirements.

Given the above description of individuals and services, databases, and possible user interfaces for HDIS, consider the following list of software qualities: Correctness, User Friendliness, Reusability, Performance. From this list, identify the two software qualities that you believe are most critical for the design and development of HDIS. For each quality that you select, make sure that you discuss the importance and relevance of the quality to HDIS, i.e., explain why HDIS is important to HDIS. You **MUST** limit your answers to **one-half (1/2) double spaced, word-processed page, with 1 inch margins, and 12 point font size** for each quality. Now consider the software principles in Chapter 3, namely: Separation of Concerns, Anticipation of Change, Generality, and Incrementality. Among these four, identify the two principles that you consider to be the most critical for the successful design and implementation of HDIS. For each chosen principle, provide at most **one-half (1/2) double spaced, word-processed page, with 1 inch margins, and 12 point font size** justification of its importance to HDIS. Be specific in your arguments by stating situations and examples to support your analyses. Overall, each student must hand in a 2 page double-spaced document with the first page on qualities and the second on principles. Please **DO NOT** explain the quality or principle; focus on its relevance and importance.

Please submit an electronic copy (MS WORD) by 2pm on Friday, Sept. 15 to Greg Johnson [gjohnson@enr.uconn.edu](mailto:gjohnson@enr.uconn.edu) and bring a hard copy to your lab session that day.