

DigitalHome Development Strategy (9/25/2010)

Background

This document describes the development strategy for development of the Digital Home prototype system, as outlined in the *DigitalHome High Level Requirements Definition (HLRD)*. The DigitalHome (DH) project was launched in September 2010 and the development team began work. The team began with an analysis of the need for a “smart house” system, conducted by the Marketing Division of HomeOwner, Inc. This included a thorough review of the HLRD and the creation of a “conceptual design” for the DH System. As a result of the analysis and the conceptual design, the team formulated the following strategy for development of the DH System.

The DH Conceptual Design and the DH Strategy are early development activities intended to promote and support effective project organization, planning, tracking, and assessment. The Conceptual Design and Strategy are not “fixed in stone” and as information about and experience with DH development accumulates, the design and strategy may change.

Strategy Criteria

The DH development team decided on the following criteria for development of the DH: Develop modules that are independent so that modules are easy to understand, easy to test and easy to maintain.

DH Development Strategy

Using the DH development strategy criteria and the DH conceptual design, the team decided on the following strategy:

- In cycle 1, produce a working product that forms the base for the rest of the system. Include an initial development of the requirements, software architecture, increment 1 construction, and system test. The User Interface and the DH manager shall be included in the first increment.
- In each subsequent cycle, revise the requirements and architecture, and complete implementation of one or more modules of functionality (e.g., House Simulation, Thermostat, etc.). At the completion of each cycle there shall be a working product, with new functionality, that is fully tested and integrated. The last cycle will include complete system testing, acceptance testing, and postmortem analysis.

After much discussion and debate, the team allocated the DH functionality to six cycles. To each cycle they added “Miscellaneous” category to take care of overhead unaccounted for in the specific DH functionality (e.g., building a test harness for the system).

Next, the team brainstormed about the approximate size (in LOC) of each module element. These estimates were based on previous work and represented a simplified Delphi method solution.

Finally, the team had to estimate the amount of effort (in days). The team leader, Disha Chandra, suggested using productivity data collected on other Homeowner projects to estimate productivity for this project. She came up with ten (10) LOC/day. The rest of the team seemed to think, based on their experience, that this was a reasonable figure. It should be noted that the 10 Loc/Day represents all the effort required to produce a LOC. That is, the effort required for development of all project artifacts (e.g., analysis, design, implementation, documentation, review, testing, rework, etc.) and includes overhead for none-project time (e.g., sick and vacation days).

The following table was the result of the DH team’s work on the DH development strategy. Their analysis was primarily based on the Conceptual Design and an attempt to keep cycles independent, and to support effective integration and testing. Their strategy shows that DH will be developed in six cycles, with approximately 3490 LOC and about 349 days (or about 12 months) of effort.

Cycle	Module/Element	Size (LOC)	Effort (Days)
1	User Interface	400	40
1	DH Manager	70	7
1	Module Stubs	80	8
1	Misc (infrastructure, non-functional code, etc.)	80	8
	Cycle 1 Totals	630	63
2	DH Manager	20	2
2	House Simulation Control	100	10
2	House Simulation Structure	150	15
2	House Simulation - DH Elements	180	18
2	House Simulation - Animation	170	17
2	Misc (infrastructure, non-functional code, etc.)	100	10
	Cycle 2 Totals	720	72
3	DH Manager	20	2
3	Thermostat Manager	50	5
3	Temperature Sensor	50	5
3	Temperature Controller	100	10
3	Humidistat Manager	50	5
3	Humidity Sensor	50	5
3	Humidity Controller	100	10
3	Misc (infrastructure, non-functional code, etc.)	100	10
	Cycle 3 Totals	520	52
4	DH Manager	20	2
4	Security Manager	50	5
4	Contact Sensor	50	5
4	Warning Alarms Controller	200	20
4	Misc (infrastructure, non-functional code, etc.)	100	10
	Cycle 4 Totals	420	42
5	DH Manager	20	2
5	Power Manager	50	5
5	Light Sensor	50	5
5	Light Controller	100	10
5	Appliance Sensor	30	3
5	Appliance Controller	100	10
5	Misc (infrastructure, non-functional code, etc.)	100	10
	Cycle 5 Totals	450	45
6	DH Planner/Scheduler	150	15
6	DH Monitor	250	25
6	DH Report	250	25
6	Misc (infrastructure, non-functional code, etc.)	100	10
	Cycle 6 Totals	750	75
	DH Project Totals	3490	349