CSE306 Software Quality in Practice

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ROADMAP

Wednesday: interactive classroom exercise
  • Put process into practice: develop code

Thursday: individual lab exercise
  • Put process into practice: develop code

After spring break

Monday: interactive classroom exercise
  • Put process into practice: bug hunt
Tuesday: individual lab exercise
  • Put process into practice: bug hunt
Things to focus on

Understand requirements
Use code repository
Blackbox test first (TDD)
Whitebox test implementation using coverage tool (gcov)
LEX12 feedback form

Understand requirements

Use code repository

Blackbox test first (TDD)

Whitebox test implementation using coverage tool (gcov)

LEX12 Feedback form
"Whitebox testing seems more complete than testing before implementation."
Understand requirements

Use code repository

Blackbox test first (TDD)

Whitebox test implementation using coverage tool (gcov)

They serve different purposes:
Blackbox testing reflects requirements.
Whitebox testing reflects implementation.

LEX12 Feedback form
"Whitebox testing seems more complete than testing before implementation."
If you decide to change your implementation, your whitebox tests are likely to change (the structure of the code has changed, so tests need to update to maintain coverage).

Your blackbox tests should not (the required functionality has not changed).

http://softwaretestingfundamentals.com/differences-between-black-box-testing-and-white-box-testing/
Problem

My sister lives in Uppsala, Sweden. I want to chat with her. I finish dinner at 7:00 PM. Should I call her?
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Probably not, but why?
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My sister lives in Uppsala, Sweden. I want to chat with her. I finish dinner at 7:00 PM. Should I call her?

Probably not, but why?

We are in different time zones!

Buffalo is in UTC-6 and Uppsala is in UTC+1.
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Seattle?

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Seattle?

Buffalo is UTC-5. Seattle is UTC-8. The difference is -3 hours. If it is 7:00 PM in Buffalo it is 4:00 PM in Seattle.

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Phoenix?

Buffalo is UTC-5.
Phoenix is UTC-7. If it is 7:00 PM in Buffalo, is it 4:00 PM in Phoenix.

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Phoenix?

Buffalo is UTC-5. Phoenix is UTC-7. If it is 7:00 PM in Buffalo, is it 4:00 PM in Phoenix? (Wait, what?)

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Phoenix?

Buffalo is UTC-5.
Phoenix is UTC-7. If it is 7:00 PM in Buffalo, is it 4:00 PM in Phoenix. (Wait, what? Phoenix does not observe daylight saving time.)

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Uppsala?

Buffalo is UTC-5. Uppsala is UTC+1. Both observe daylight saving time.

If it is 7:00 PM in Buffalo, is it midnight in Uppsala.

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Uppsala?

Buffalo is UTC-5. Uppsala is UTC+1. Both observe daylight saving time.

If it is 7:00 PM in Buffalo, is it midnight in Uppsala. (Wait, what?)

What do you need to know to answer this question?
Problem

Given two cities, determine the time difference between the two.

Example: What is the time difference between Buffalo and Uppsala?

Buffalo is UTC-5. Uppsala is UTC+1. Both observe daylight saving time.

If it is 7:00 PM in Buffalo, is it midnight in Uppsala? (Wait, what? Switch to daylight time happens on different dates.)

What do you need to know to answer this question?
Understand requirements

Compute the time difference between two locations.

https://www.worldtimezone.com/daylight.html
https://www.worldtimezone.com
Use Code Repository

How do we start?
Use Code Repository

How do we start?

Let's create on BitBucket, and clone a local copy. In local copy, create a new branch to add a 'time' feature, and check out that branch.
Blackbox test first (TDD)

How do we start?
Blackbox test first (TDD)

How do we start?

Let's set up a makefile to use CUnit. We'll have these files to start with:

- time.h
- time.c
- timeTests.c
OBJECTS = time.o
EXECUTABLE = timeTests

CC = gcc
CFLAGS = -g -Wall

time.o: time.c time.h
    $(CC) $(CFLAGS) -c time.c

tests: $(OBJECTS) timeTests.c
    $(CC) $(CFLAGS) -L $(CUNIT_PATH_PREFIX)lib -I $ (CUNIT_PATH_PREFIX)include/$(CUNIT_DIRECTORY) $(OBJECTS) timeTests.c -o $(EXECUTABLE) -lcunit

.PHONY: clean
clean:
    rm -rf *~ *.o $(EXECUTABLE) *.xml
#include <stdio.h>
#include <string.h>
#include <stdbool.h>
#include "CUnit.h"
#include "Automated.h"
#include "time.h"

void test01(void) {}

int main() {
    CU_pSuite Suite = NULL;
    if (CUE_SUCCESS != CU_initialize_registry()) { return CU_get_error(); }
    Suite = CU_add_suite("Suite_of_tests_with_valid_inputs", NULL, NULL);
    if (NULL == Suite) {
        CU_cleanup_registry();
        return CU_get_error();
    }
    if ( ( NULL == CU_add_test(Suite, "message", test01) ) ) {
        CU_cleanup_registry();
        return CU_get_error();
    }
    if ( ( NULL == CU_add_test(Suite, "message", test01) ) ) {
        CU_cleanup_registry();
        return CU_get_error();
    }
    CU_set_output_filename("test");
    CU_automated_run_tests();
    CU_cleanup_registry();
    return CU_get_error();
}
Whitebox test implementation

How do we start?
Whitebox test implementation

How do we start?

First write an implementation.

Next adapt makefile to work with gcov.

Compile/run executable/run gcov and determine coverage.

Add whitebox tests to get to 100% coverage.
Adapted makefile

```
OBJECTS = time.o
EXECUTABLE = timeTests

CC = gcc
CFLAGS = -g -Wall -O0 -fprofile-arcs -ftest-coverage

time.o: time.c time.h
    $(CC) $(CFLAGS) -c time.c

tests: $(OBJECTS) timeTests.c
    $(CC) $(CFLAGS) -L $(CUNIT_PATH_PREFIX)lib -I $ (CUNIT_PATH_PREFIX)include/$(CUNIT_DIRECTORY) $(OBJECTS) timeTests.c -o $(EXECUTABLE) -lcunit -lgcov

.PHONY: clean
clean:
    rm -rf *~ *.o *.dSYM $(EXECUTABLE) *.xml *.gc??
Do it!

Let's see what you come up with.

Work in small groups (either those around you or your regular teammates - it doesn't matter).

Make sure to add the cse306 course account to your repo.

Call your repo ProcessExercise1