Theory of Programming Languages

Semester-long Programming Project

Goals
- to enjoy a simple programming assignment done in a wide variety programming languages, both historical and recent, both procedural and functional.
- to reflect on this experience though a consulting log.
- to discuss some philosophical thoughts and pondering about programming and languages.

Instructions
1. Develop a set of functions that will allow you to **encrypt** a string using a Caesar cipher.
2. Develop a set of functions that will allow you to **decrypt** a string using a Caesar cipher.
3. Develop a set of functions that will help you to **solve** (break) the cipher.

Implement all of the above functions in all of the following languages:

Encrypt, Decrypt, Solve in Fortran	[15, 15, 20 points]
Encrypt, Decrypt, Solve in Cobol	[15, 15, 20 points]
Encrypt, Decrypt, Solve in Pascal	[15, 15, 20 points]
Encrypt, Decrypt, Solve in Scala	[15, 15, 20 points]
Encrypt, Decrypt, Solve in LISP	[15, 15, 20 points]
Encrypt, Decrypt, Solve in ML	[15, 15, 20 points]
Encrypt, Decrypt, Solve in Erlang	[15, 15, 20 points]

Make a prediction about how long you think it will take you to program [50 points] this assignment. Write it down. Then keep a log of your work, just like you would as a consultant. The format should be something similar to the following:

```
Date      Hours Spent      Tasks / Accomplishments / Issues
```

Be thorough and descriptive in your log. Sum the hours spent when you are finished. Note your original prediction on the log. Write a paragraph to explain the discrepancy. (It'll be huge.)

Finally, and most importantly, write a running commentary about your thoughts and experience with each language, including how each language is similar or dissimilar to the others. Write as well of your thoughts on each languages readability and writability, and what you enjoyed and hated about each. This is, by far, my favorite part of grading this assignment. I look forward to reading your thoughts and comments as you go along, so be thoughtful, thorough, and impress me.

Submitting
Print out your consulting log, commentary, all printed source code, and output of thorough test runs. Staple it together, and hand it in to me any time **before** the class in which it is finally due. Remember to include your name in the write-up and in the comments of source code.

Examples
on the next page

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Examples

The usage for **encrypt** and **decrypt** should be as follows:

```
encrypt(str, shiftAmount)
decrypt(str, shiftAmount)
```

ML example:

```
- val x = encrypt("This is a test string from Alan", 8);
val x = "BPQA QA I BMAB ABZQVO NZWU ITIV" : string

- decrypt(x, 8);
val it = "THIS IS A TEST STRING FROM ALAN" : string
```

Things might be easier if you use only capital letters, so consider writing a "toUpper" function so that you can deal with mixed-case input. It's okay if your output is all caps.

The usage for **solve** should be as follows:

```
solve(str, maxShiftValue);
```

ML example:

```
- solve("HAL", 26);

Caesar 26: HAL
Caesar 25: GZK
Caesar 24: FYJ
Caesar 23: EXI
Caesar 22: DWH
Caesar 21: CVG
Caesar 20: BUF
Caesar 19: ATE
Caesar 18: ZSD
Caesar 17: YRC
Caesar 16: XQB
Caesar 15: WPA
Caesar 14: VOZ
Caesar 13: UNY
Caesar 12: TMX
Caesar 11: SLW
Caesar 10: RKV
Caesar 9: QJU
Caesar 8: PIT
Caesar 7: OHS
Caesar 6: NGR
Caesar 5: MFQ
Caesar 4: LEP
Caesar 3: KDO
Caesar 2: JCN
Caesar 1: IBM
Caesar 0: HAL
val it = "" : string
```