Elements of Programming in Perl
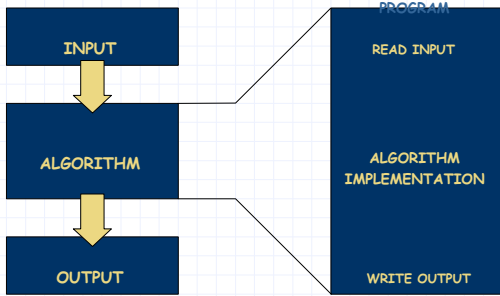
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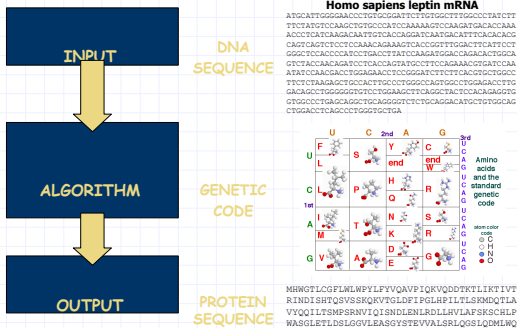# INTRODUCTION

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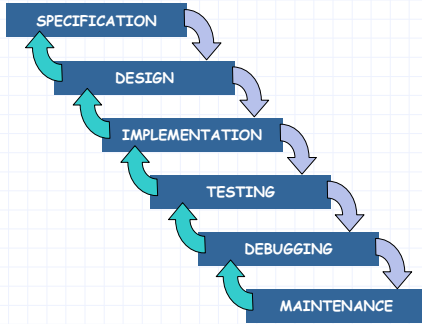
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Algorithms

PROGRAM

INPUT → READ INPUT

ALGORITHM → ALGORITHM IMPLEMENTATION

OUTPUT → WRITE OUTPUT

Algorithms in Biology

Homo sapiens leptin mRNA

INPUT — DNA SEQUENCE

ALGORITHM — GENETIC CODE

OUTPUT — PROTEIN SEQUENCE

The Software Development Cycle

- SPECIFICATION
- DESIGN
- IMPLEMENTATION
- TESTING
- DEBUGGING
- MAINTENANCE

PERL

⇨ Perl is a high-level programming created by Larry Wall and a cast of thousands, initially released in 1987.

⇨ It derives from the ubiquitous C programming language and to a lesser extent from sed, awk, the Unix shell, and at least a dozen other tools and languages.

⇨ The most recent production release is 5.8.2 (5.005_03 and 5.6.2 are still supported). The most cutting-edge development release is 5.9.

⇨ Where to find help:
  ⇨ Your local Perl guru
  ⇨ MAN pages and PERLDOC
  ⇨ "Perl Cookbook", "Programming Perl", "Elements of Programming in Perl", etc...
  ⇨ http://cpan.org/
  ⇨ http://perl.com/

Perl phylosophy

TMTOWTDI

"There's More Than One Way To Do It"

Laziness

The quality that makes you go to great effort
to reduce overall energy expenditure.

Impatience

The anger you feel when the computer is being lazy.

Hubris

The quality that makes you write (and maintain) programs
that other people won't want to say bad things about.

Installing Perl

⇨ UNIX

Download latest version from CPAN.

Take a look to README/INSTALL files, and:

```
sh ./Configure;  make;  make test;  make install;
```

⇨ WINDOWS

Obtain a perl port (for instance, **ActiveState** Perl version from http://www.activestate.com/), and double-clik on the archive.

⇨ MAC

Compiled binary distribution for MacOS is available in the ports section of CPAN.

Writing Code

⇨ Structure

```
$s=0;$i=1;while($i<=
10){$s=$s+$i;$i=$i+
1;} print
"The result is $s\n";
```

```
$s = 0;
$i = 1;
while ($i <= 10) {
    $s = $s + $i;
    $i = $i + 1;
};
print "The result is $s\n";
```

⇨ Naming

```
$a = "ATGGGTA"
```

```
$dnaseq = "ATGGGTA"
```

⇨ Comments

"#" comments / POD comments / Literate Programming

⇨ Being `strict`

Declare variables and **Initialize** to default values

```
use strict;
use warnings;
```

Our First Perl Script

· Pure perl command-line:

```
sh$ perl -e 'print "To bit or not to bit, that is the question...\n"'<RETURN>
To bit or not to bit, that is the question...
sh$
```

· Perl command-line:

```
sh$ cat > myfirstscript.pl<RETURN>
print "To bit or not to bit, that is the question...\n"<RETURN>
<CTRL-D>
sh$ perl myfirstscript.pl<RETURN>
To bit or not to bit, that is the question...
sh$
```

· Running a perl script:

```
sh$ which perl<RETURN>
/usr/bin/perl
sh$ cat > myfirstscript.pl<RETURN>
#!/usr/bin/perl
print "To bit or not to bit, that is the question...\n"<RETURN>
<CTRL-D>
sh$ chmod a+x myfirstscript.pl<RETURN>
sh$ ./myfirstscript.pl<RETURN>
To bit or not to bit, that is the question...
sh$
```

Perl PRAGMAS

Pragmas are modules that change the behaviour of the interpreter.

```perl
use strict;
```
   'refs' => generating run-time error if you use symbolic references
   'vars' => compile-time error if variable was not previously declared
   'subs' => barewords are treated as syntax errors

```perl
use warnings;
use constant PI => 3.14159;
use libs qw( /my/local/path/to/libs );
```
   modifiying @INC at compile time

```perl
use vars qw/ $dnaseq %codon_table @nucleotides /;
```
   better => our($dnaseq,%codon_table,@nucleotides);

```perl
use subs qw/ read_seq reverse_complement /;
```
   better => sub read_seq($); sub reverse_complement($);

Suggested Bibliography

Elements of Programming with Perl
Andrew Johnson
Ed. Manning, 1st edition, 1999

Perl Cookbook
Tom Christiansen, Nathan Torkington
Ed. O'Reilly, 2nd edition, 2003

Learning Perl
Randal L. Schwartz, Tom Phoenix
Ed. O'Reilly, 3rd edition, 2001

Programming Perl
Larry Wall, Randal L. Schwartz, Tom Christiansen, Jon Orwant
Ed. O'Reilly, 3rd edition, 2003

Beginning Perl for Bioinformatics
James Tisdall
Ed. O'Reilly, 1st edition, 2001

Genomic Perl:
From Bioinformatics Basics to Working Code
Rex A. Dwyer
Cambridge University Press, 1st edition, 2002

Materials for Perl Course

http://genome.imim.es/~jabril/teaching/MScBioinfo2004_H16/