

## Chapter 7 outline:

- ▶ Recursively-defined sets (week-before Monday)
- ▶ Structural induction (last week Monday)
- ▶ Mathematical induction (last week Wednesday)
- ▶ Non-recursive programs—loops (last week Friday)
- ▶ Loop invariant proofs (Monday)
- ▶ ~~A language processor~~ The Huffman encoding (**Today**)

## Today:

- ▶ The idea of an encoding
- ▶ Full binary trees and encodings
- ▶ Building an optimal encoding
- ▶ Implementation

A	65	01000001	E	69	01000101
B	66	01000010	F	70	01000110
C	67	01000011	G	71	01000111
D	68	01000100	H	72	01001000

*IF THIS IS A CONSULAR SHIP THEN WHERE IS THE AMBASSADOR*

I	F	L	T	H	I	S
73	70	32	84	72	73	83
01001001	01000110	00100000	01010100	01001000	01001001	01010011

*IF THIS IS A CONSULAR SHIP THEN WHERE IS THE AMBASSADOR*

The character types that occur in this text have in-text frequencies

I	10	E	4	B	1	M	1
S	7	R	3	C	1	P	1
A	5	T	3	D	1	U	1
H	5	N	2	F	1	W	1
I	5	O	2	L	1		

*IF THIS IS A CONSULAR SHIP THEN WHERE IS THE AMBASSADOR*

I	0	E	11	B	100	M	0001
S	1	R	000	C	101	P	0010
A	00	T	001	D	110	U	0011
H	01	N	010	F	111	W	0111
I	10	O	011	L	0000		

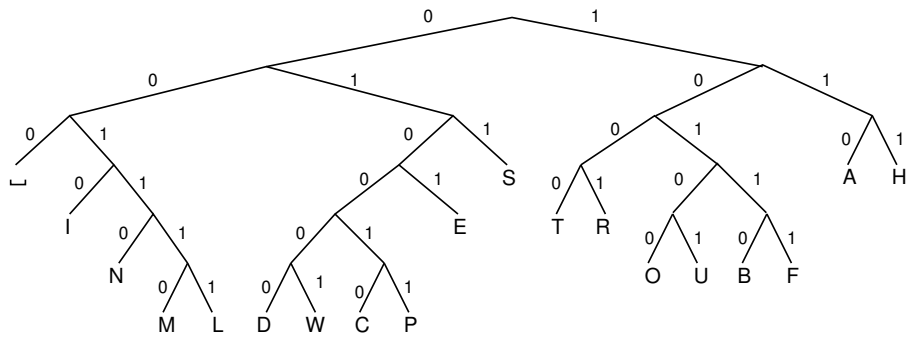
*1011100010110101010000101011010100110000000001011000100001  
0111010001110111000110101000101110000001100001100110001000*

*IF THIS IS A CONSULAR SHIP THEN WHERE IS THE AMBASSADOR*

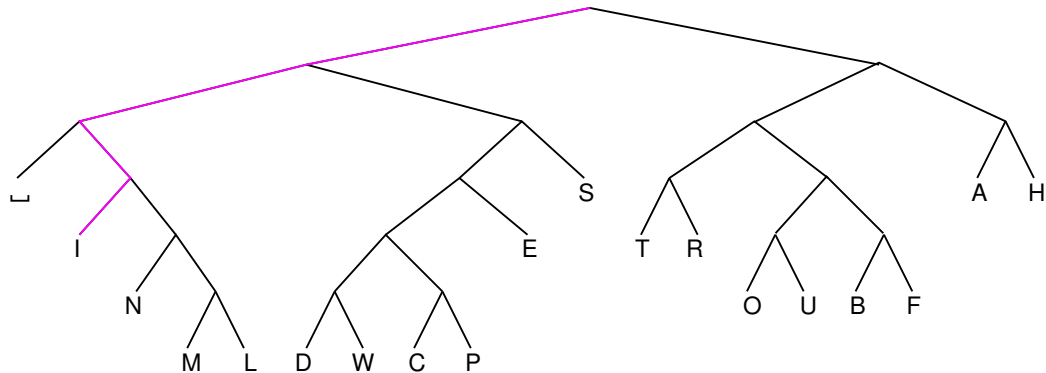
┌	000	E	0101	M	001110	S	011
A	110	F	10111	N	00110	T	1001
B	10110	H	111	O	10100	U	10101
C	010010	I	0010	P	010011	W	010000
D	010001	L	001111	R	1000		

I	F	┌	T	H	I	S	┌	A	┌	...
0010	10111	000	1001	111	0010	011	000	110	000	

L	000	E	0101	M	001110	S	011
A	110	F	10111	N	00110	T	1001
B	10110	H	111	O	10100	U	10101
C	010010	I	0010	P	010011	W	010000
D	010001	L	001111	R	1000		

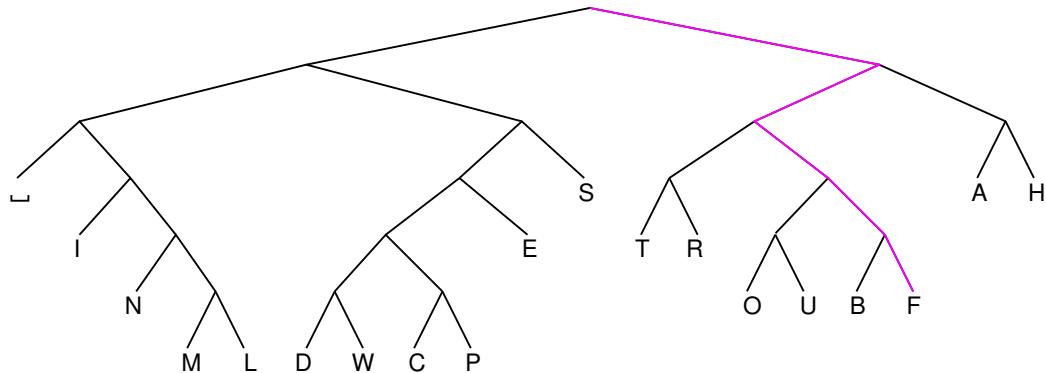


00101011100010011110010011000110000...



I

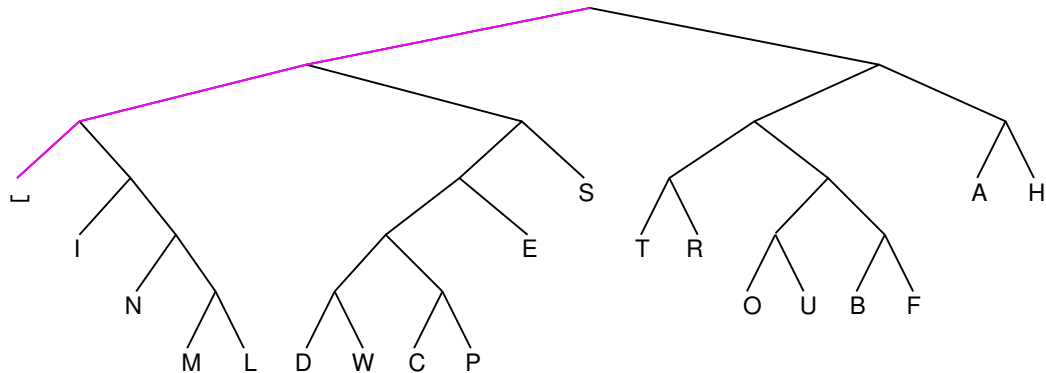
00101011100010011110010011000110000...



IF

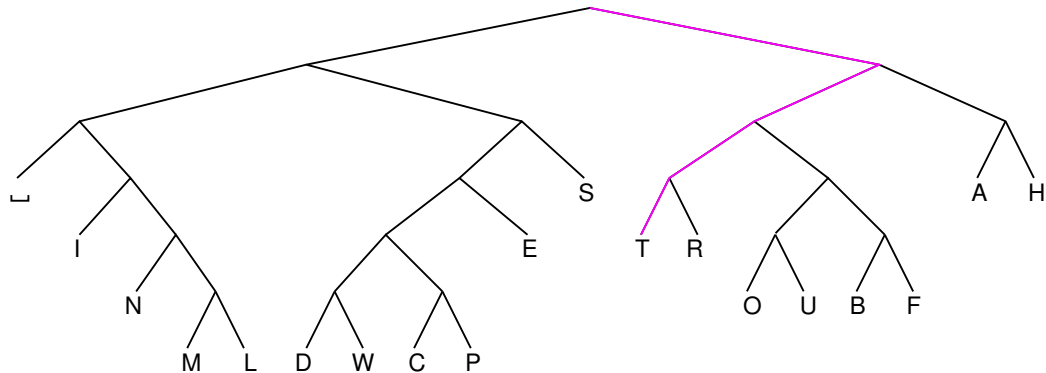


0010101110001001110010011000110000...



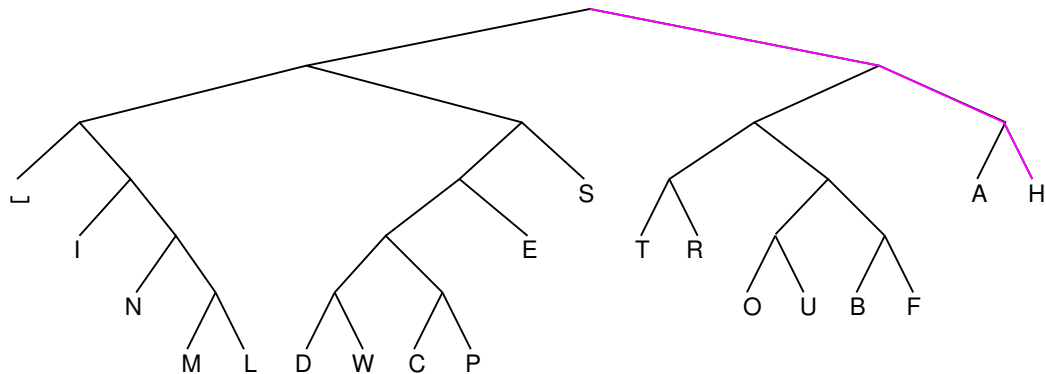
IF\_

00101011100010011110010011000110000...



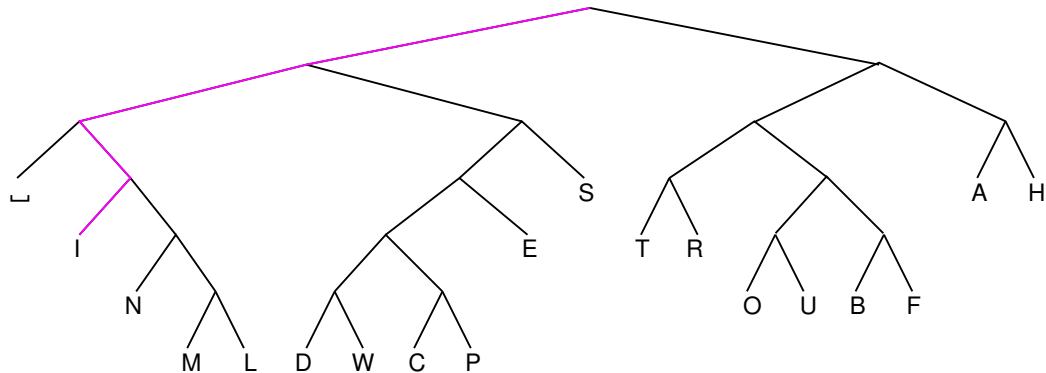
IF\_T

00101011100010011110010011000110000...

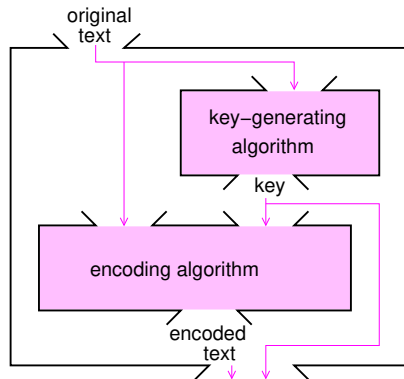
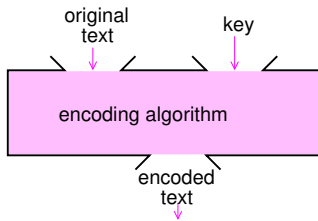


IF\_LTH

00101011100010011110010011000110000...



IF\_THI



S

**For next time:**

*Look over review sheet*