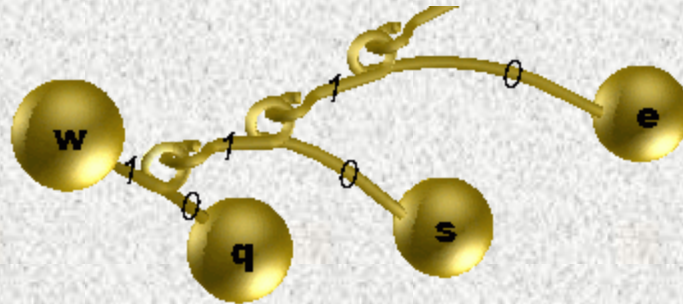


Analysis of Algorithms

Huffman Codes



Prof. Muhammad Saeed

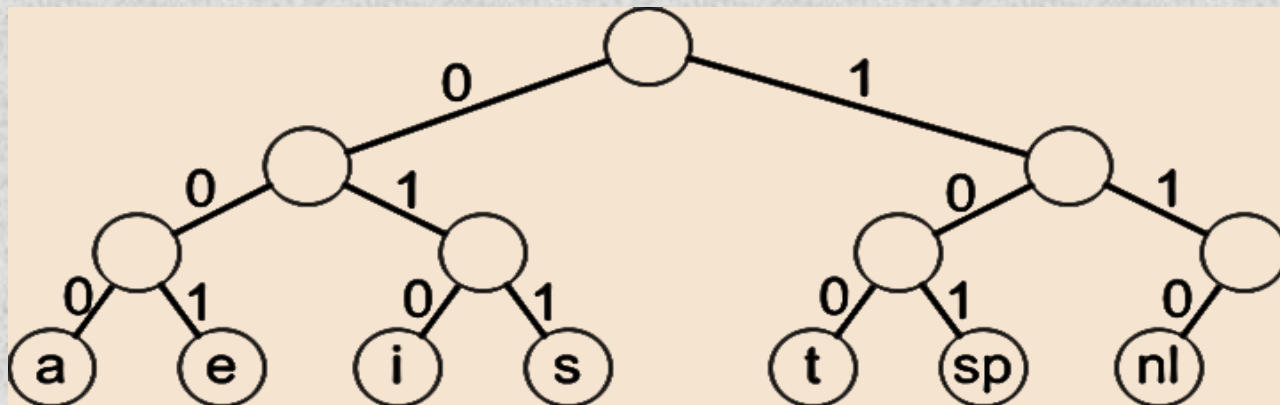
Standard Coding Scheme

Table

Code length=3

Character	Code	Frequency	Total Bits
a	000	10	30
e	001	15	45
i	010	12	36
s	011	3	9
t	100	4	12
space	101	13	39
newline	110	1	3
Total		58	174

Tree



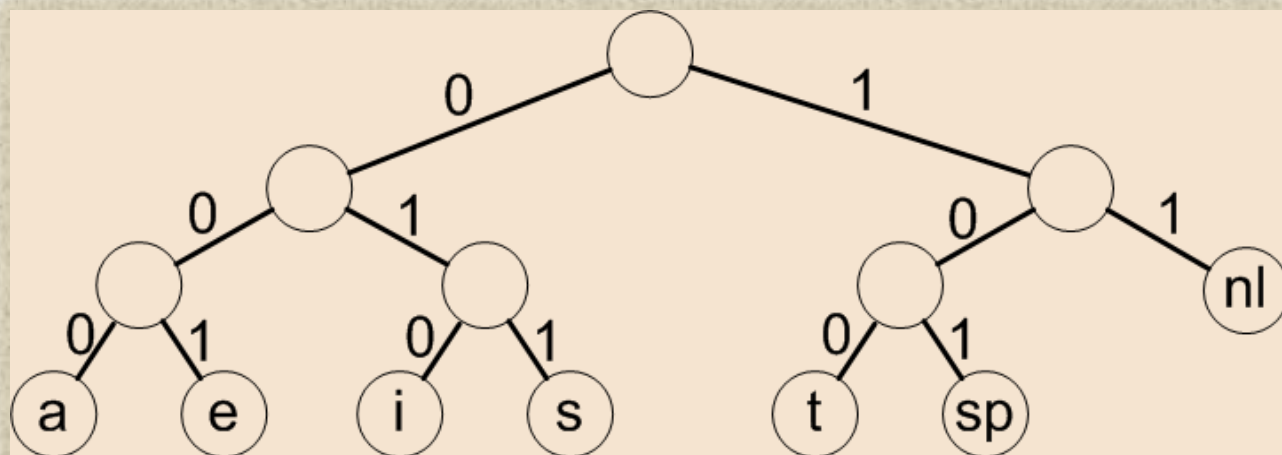
Standard Coding Scheme

Table

Code length=3

Character	Code	Frequency	Total Bits
a	000	10	30
e	001	15	45
i	010	12	36
s	011	3	9
t	100	4	12
space	101	13	39
newline	110	1	2
Total		58	173

Tree



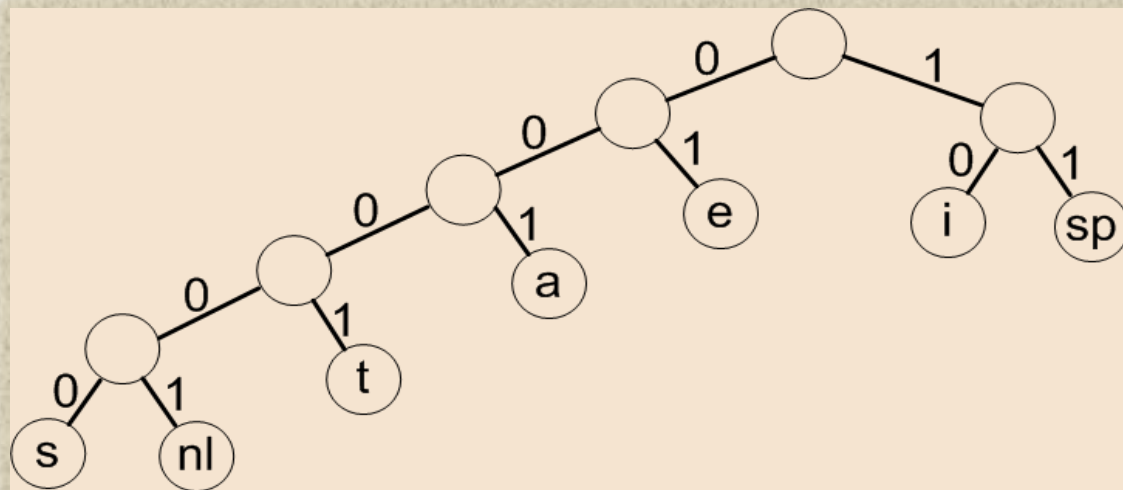
Standard Coding Scheme

Table

Variable
Code Length

Prefix Code

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146



Tree

Standard Coding Scheme

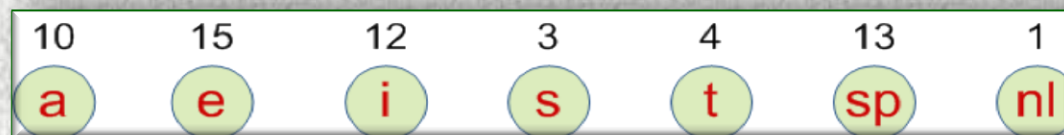
Table

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

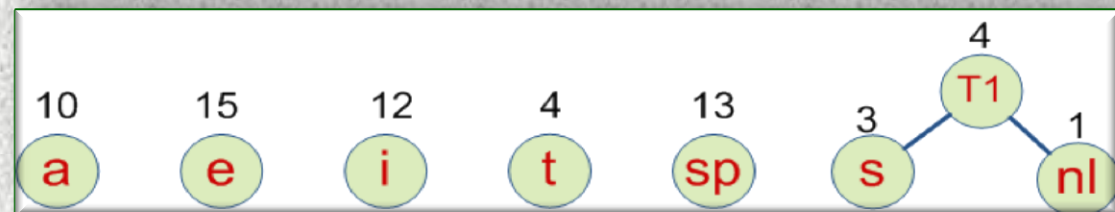
Table

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
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Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

Table

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e	01	15	30
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s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

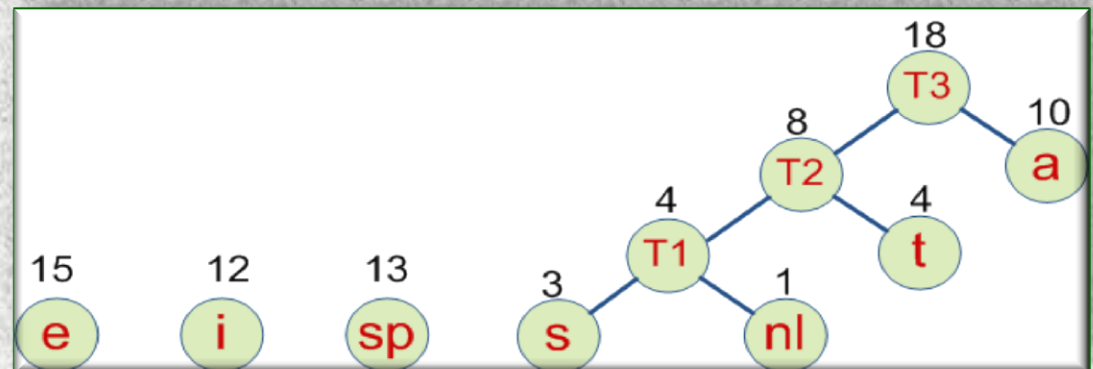
Table

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

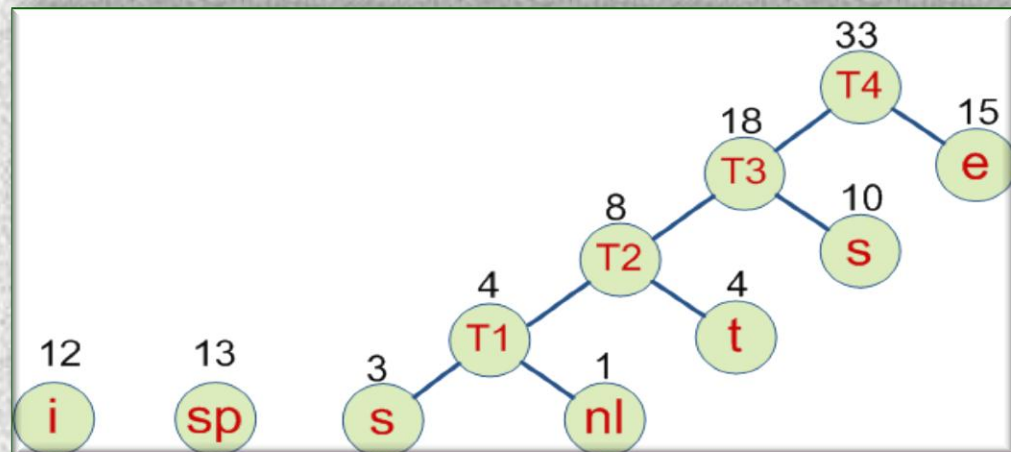
Table

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

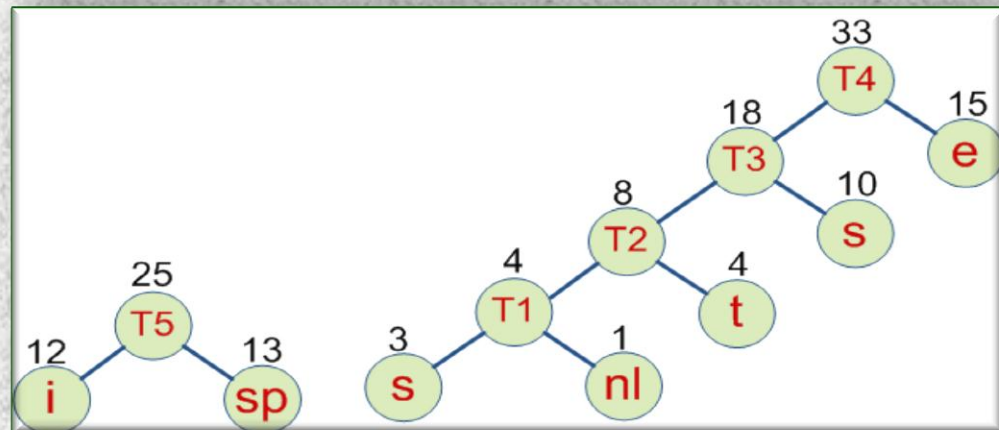
Table

Character	Code	Frequency	Total Bits
a	001	10	30
e	01	15	30
i	10	12	24
s	00000	3	15
t	0001	4	16
space	11	13	26
newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Standard Coding Scheme

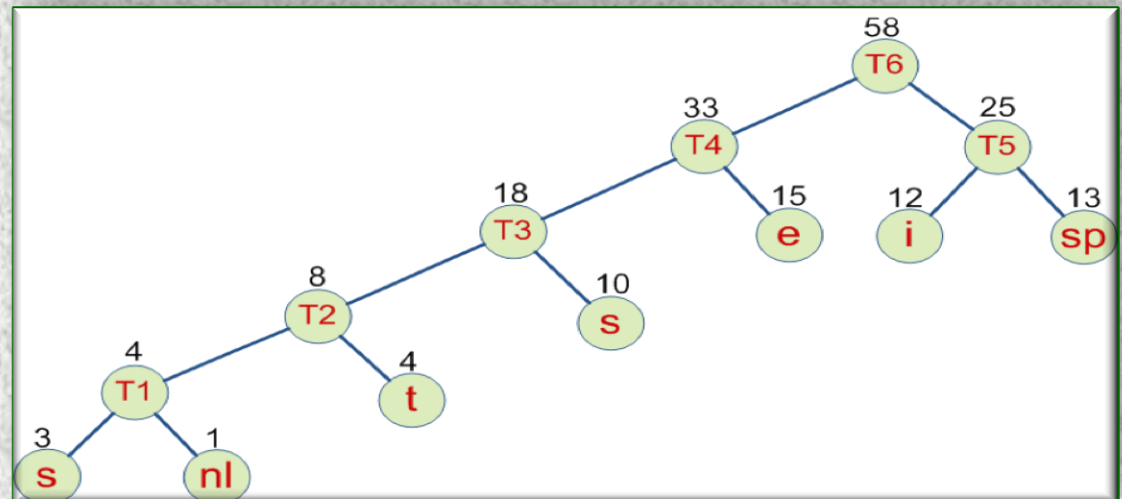
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s	00000	3	15
t	0001	4	16
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newline	00001	1	5
Total		58	146

Formation of Tree

and

Code generation



Time Complexity:

- ❑ 1) If tree is maintained as a priority queue, ordered by weight, then the running time is $O(C \log(C))$.
- ❑ Linked list would give an $O(C^2)$ algorithm.

Example:

Symbol	Probability	Codeword
K	0.05	10101
L	0.2	01
U	0.1	100
W	0.05	10100
E	0.3	11
R	0.2	00
?	0.1	1011

End
Huffman Codes