## 5. Sorting program – read a data from 'input.txt'

```
package main

import (
"fmt"
"io"
"os"
)

func check(e error){
        if e != nil{
                panic(e)
        }
}

func main(){
        dat, err := os.Open("input.txt")
        check(err)

        var perline int
        var num []int
        for{
                _,err := fmt.Fscanf(dat, "%d₩n",&perline);

                if err != nil{
                        if err == io.EOF{break}
                        fmt.Println(err)
                        os.Exit(1)
                }
                num = append(num, perline)
        }
        fmt.Println(num)
        for i:= 0; i< len(num); i++{
                for j:= 0; j< i; j++{
                        if(num[i] < num[j]){num[i], num[j] = num[j], num[i]}
                }
        }
        fmt.Println(num)

        f, err := os.Create("output.txt")
        if err != nil{
                fmt.Println(err)
                return
        }
        for i := range num{
                fmt.Fprintf(f, "%d₩n", num[i])
        }
        f.Close()
}
```

## 6. 트리 순회 문제

### 1) channel 사용 안하고 tree traverse 함수 작성

- 데이터값(value)을 left->right 순(소팅 순)으로 출력하시오.

```
package main

import(
        "fmt"
        "math/rand"
)

type Tree struct{
        Left *Tree
        Value int
        Right *Tree
}

func NewTree(k int) *Tree{
        var t *Tree
        for _, v := range rand.Perm(10){
                t = insert(t, (1+v) * k)
        }
        return t
}

func insert(t *Tree, v int) *Tree{
        if t == nil{
                return &Tree{nil, v, nil}
        }
        if v < t.Value{
                t.Left = insert(t.Left, v)
        }else{
                t.Right = insert(t.Right, v)
        }
        return t
}

func Traverse(t *Tree){
        if t == nil{
                return
        }
        Traverse(t.Left)
        a := t.Value
        fmt.Print(a," ")
        Traverse(t.Right)
}

func main() {

        newTree:=NewTree(1)
        Traverse(newTree)
        fmt.Println()
}
```

- tree 모양을 괄호 모양으로 출력하시오.

예 1: (3 (1 (1) (2)) (8 (5) (13)))  --> (value l-tree r-tree)

예 2: (8 (3 ((1 (1) (2))) (5)) (13))

```
package main

import(
        "fmt"
        "math/rand"
)

type Tree struct{
        Left *Tree
        Value int
        Right *Tree
}

func NewTree(k int) *Tree{
        var t *Tree
        for _, v := range rand.Perm(10){
                t = insert(t, (1+v) * k)
        }
        return t
}

func insert(t *Tree, v int) *Tree{
        if t == nil{
                return &Tree{nil, v, nil}
        }
        if v < t.Value{
                t.Left = insert(t.Left, v)
        }else{
                t.Right = insert(t.Right, v)
        }
        return t
}

func (t *Tree) Traverse() string{
        if t == nil{
                return "()"
        }
        s := ""
        if t.Left != nil{
                s += t.Left.Traverse() +""
        }
        s += fmt.Sprint(t.Value)
        if t.Right != nil{
                s += ""+ t.Right.Traverse()
        }
        return "(" + s + ")"
}
```

```
func main() {

	newTree:=NewTree(1)
	fmt.PrintIn(newTree.Traverse())
}
```

- tree 의 모양을 tab 문자 이용, 좌로 90 도 회전하여 출력하시오.(아래 put-tree.c 참조)

```
package main

import(
        "fmt"
        "math/rand"
)

var N_nodes int= 0

type Node struct{
        data int
        nchild int
        down *Node
        right *Node
}

func put_tree(node *Node, depth int){
        var p *Node

        if node == nil{
                return
        }
        for j:= 0; j< depth; j++{
                fmt.Print("               ")
        }
        fmt.Println(node.data,"(",node.nchild,")")

        if node.nchild > 0{
                p = node.down
                for i:= node.nchild-1; i>=0; i--{
                        put_tree(p, depth+1)
                        if p == nil{return}
                        p = p.right
                }
        }
}

func del_tree(node *Node){
        if node == nil{return}

        if(node.down != nil){
                del_tree(node.down)
        }
        if(node.right != nil){
                del_tree(node.right)
        }

        N_nodes = N_nodes-1
}

func get_newnode() *Node{
```

```
	var node *Node = new(Node)

	node.nchild = rand.Intn(4)+1
	node.down = nil
	node.right = nil

	N_nodes = N_nodes+1
	return node
}

func build_tree(n int) *Node{

	var node *Node = get_newnode()
	node.data = n * 1000

	if n-1 > 0{
		node.down = build_tree(n-1)
		node.down.data = node.down.data +1

		n2 := node.down
		for i:=0; i < node.nchild-1; i++{
			n2.right = build_tree(n-1)
			n2.right.data = (n2.right.data + (i+2))

			n2 = n2.right
		}
	}else{
		node.nchild = 0
	}
	return node
}

func main(){
	depth := 4
	var root *Node

	root = build_tree(depth)
	fmt.Println("Total", N_nodes," nodes are created!")

	put_tree(root,0)
	del_tree(root)
	if(N_nodes != 0){
		fmt.Println("Total %d nodes are remaining!₩n", N_nodes)
	}
}
```

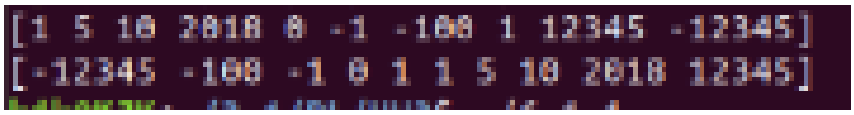
2) channel 사용하여 데이터값(value)을 left->right 순(소팅 순)으로 출력하시오.

```
package main

import(
        "fmt"
        "math/rand"
)

type Tree struct{
        Left *Tree
        Value int
        Right *Tree
}

func NewTree(i int) *Tree{
        var t *Tree
        for _,v := range rand.Perm(10){
                t = insert(t, (1+v) * i)
        }
        return t
}

func insert(t *Tree, v int) *Tree{
        if t == nil{
                return &Tree{nil, v, nil}
        }
        if v < t.Value{
                t.Left = insert(t.Left, v)
                return t
        }else{
                t.Right = insert(t.Right, v)
                return t
        }
        return t
}

func channel_tree(a int, c chan int){
        prints := a
        c <- prints
}

func Traverse(t *Tree){
        if t == nil{
                return
        }

        Traverse(t.Left)
        var a int
        c := make(chan int)
        a = t.Value
        go channel_tree(a, c)
        x := <- c
        fmt.Print(" ",x)
        Traverse(t.Right)
```

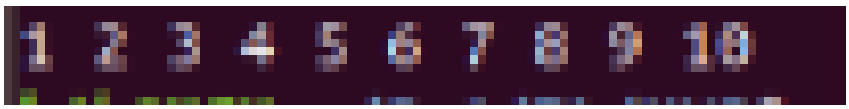
```
}

func main(){

        newTree := NewTree(1)
        Traverse(newTree)
        fmt.Println()
}
```

실행화면

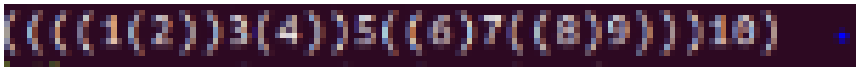
5.



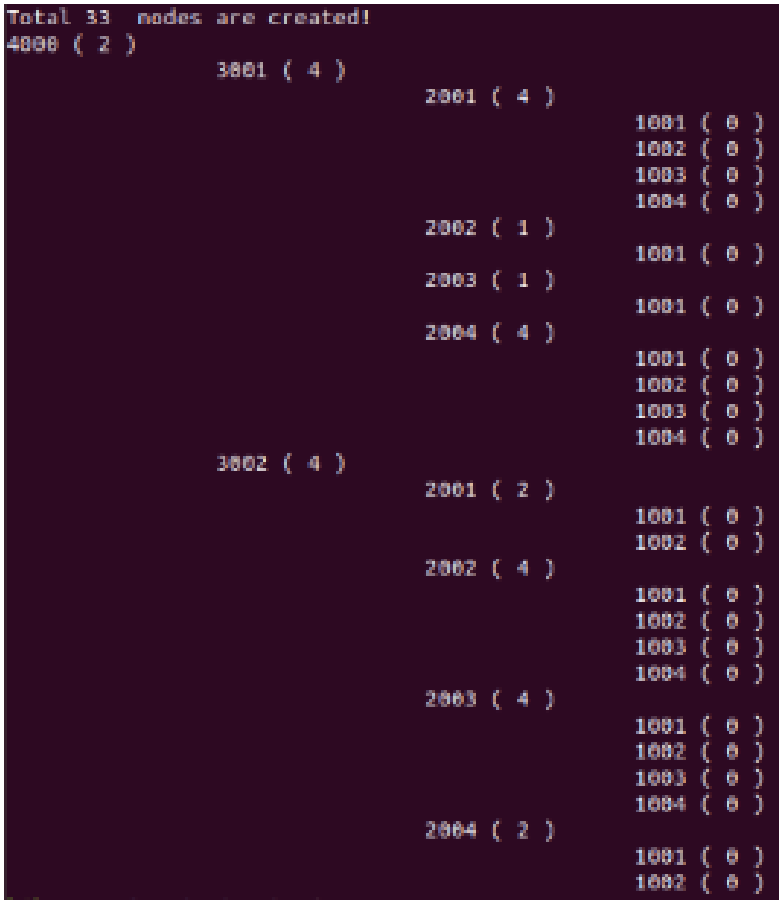

6-1-1.




6-1-2.




6-1-3.




6-2