

# Concepte fundamentale ale limbajelor de programare

Tipuri de date abstracte

Curs 09

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# Cuprins

- 1 Tip stiva de intregi
- 2 Modul stiva de intregi
- 3 Tip stiva de tip\_el
- 4 Modul stiva de tip\_el



# Tip stiva de intregi

```
type stack(nr_max:integer)=class  
  
  operations  
    pop, push, top;  
  
  var tab_st:array[1..nr_max] of integer;  
      ind:integer;
```



# Tip stiva de intregi

```
function pop():integer;  
begin  
  if not empty() then  
    ind:=ind-1;  
    return tab_st[ind];  
  else  
    exception;  
  end if;  
end;
```



# Tip stiva de intregi

```
procedure push(x:integer);
begin
  if not overflow() then
    tab_st[ind]:=x;
    ind:=ind+1;
  else
    exception;
  end if;
end;
```



# Tip stiva de intregi

```
function top():integer;
begin
  if not empty() then
    return tab_st[ind-1];
  else
    exception;
  end if;
end;
```



# Tip stiva de intregi

```
function empty():boolean;  
begin  
    return ind=1;  
end;
```

```
function overflow():boolean;  
begin  
    return ind>nr_max;  
end;
```



# Tip stiva de intregi

```
begin
  ind:=1;
end;
```





## Exemplu de utilizare

```
var
  st1,st2 : stack(100);
  st3 : stack(55);

st1.push(10);
...
st2.push(k);
...
i:=st1.top();
...
j:=st2.pop();
```



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- 1 Tip stiva de intregi
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# Modul stiva de intregi

```
module st;  
  
export  
  stack,pop,push,top,init;  
  
type stack(nr_max:integer)=record  
  tab_st:array[1..nr_max] of integer;  
  ind:integer;  
end record;
```



# Modul stiva de intregi

```
function pop(var s:stack):integer;
begin
  if not empty(s) then
    s.ind:=s.ind-1;
    return s.tab_st[s.ind];
  else
    exception;
  end if;
end;
```



# Modul stiva de intregi

```
procedure push(var s:stack;x:integer);
begin
  if not overflow(s) then
    s.tab_st[s.ind]:=x;
    s.ind:=s.ind+1;
  else
    exception;
  end if;
end;
```



# Modul stiva de intregi

```
function top(s:stack):integer;
begin
  if not empty(s) then
return s.tab_st[s.ind-1]
  else
    exception;
  end if;
end;
```



# Modul stiva de intregi

```
procedure init(var s:stack);
begin
  s.ind:=1;
end;

function empty(var s:stack):boolean;
begin
  return s.ind=1;
end;
```



# Modul stiva de intregi

```
function overflow(var s:stack):boolean;  
begin  
  return s.ind>s.nr_max;  
end;  
  
var  
  st1,st2:st.stack(100);  
  st3:st.stack(50);
```





## Exemplu de utilizare

```
st.init(st1);  
st.init(st2);  
st.init(st3);  
...  
st.push(st1,10);  
...  
st.push(st2,k);  
...  
i:=st.top(st1);  
...  
j:=st.pop(st2);
```



# Cuprins

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# Tip stiva de tip\_el

```
type stack(type tip_el, nr.max:integer)=class
```

```
operations
```

```
  pop, push, top;
```

```
var var.st:array[1..nr.max]of tip.real;
```

```
ind:integer;
```



# Tip stiva de tip\_el

```
function pop():tip_el;  
begin  
  ...  
end;  
  
procedure push(x:tip_el);  
begin  
  ...  
end;
```



# Tip stiva de tip\_el

```
function top():tip_el;  
begin  
...  
end;
```

```
function empty():boolean;  
begin  
...  
end;
```



# Tip stiva de tip\_el

```
function overflow():boolean;  
begin  
  ...  
end;  
  
begin  
  ...  
end;
```



## Exemplu de utilizare

```
type t=-----  
var  
  st1 : stack(integer,100);  
  st2 : stack(real,150);  
  st3 : stack(t,50);  
  ...  
st1.push(10);  
st2.push(1.5);
```



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# Modul stiva de tip\_el

```
module st(type tip_el);  
  
export  
  stack, pop, push, top, init;  
  
type stack(nr.max:integer) = record  
  tab_st:array[1..nr.max] of tip_el;  
  ind:integer;  
end record;
```



# Modul stiva de tip\_el

```
function pop(var s:stack) : tip.el;  
begin  
  ...  
end;
```

```
procedure push(var s:stack; x:tip.el);  
begin  
  ...  
end;
```



# Modul stiva de tip\_el

```
function top(var s:stack) : tip.el;  
begin  
  ...  
end;  
  
procedure init(var s:stack);  
begin  
  ...  
end;
```



# Modul stiva de tip\_el

```
function empty(var s:stack) : boolean;
begin
  ...
end;
```

```
function overflow(var s:stack) : boolean;
begin
  ...
end;
```

```
begin
  ...
end;
```



# Exemplu de utilizare

```
type t = -----;  
module st_int = st(integer);  
module st_real = st(real);  
module st_t = st(t);
```



```
var
  st1 : st_int_stack(100);
  st2 : st_real_stack(150);
  st3 : st_t_stack(50);
...
st_int.push(st1,10);
...
st_real.push(st2,1.5);
...
```



# Bibliografie

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- 2 Carlo Ghezzi, Mehdi Jarayeri – Programming Languages, John Wiley, 1987.
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