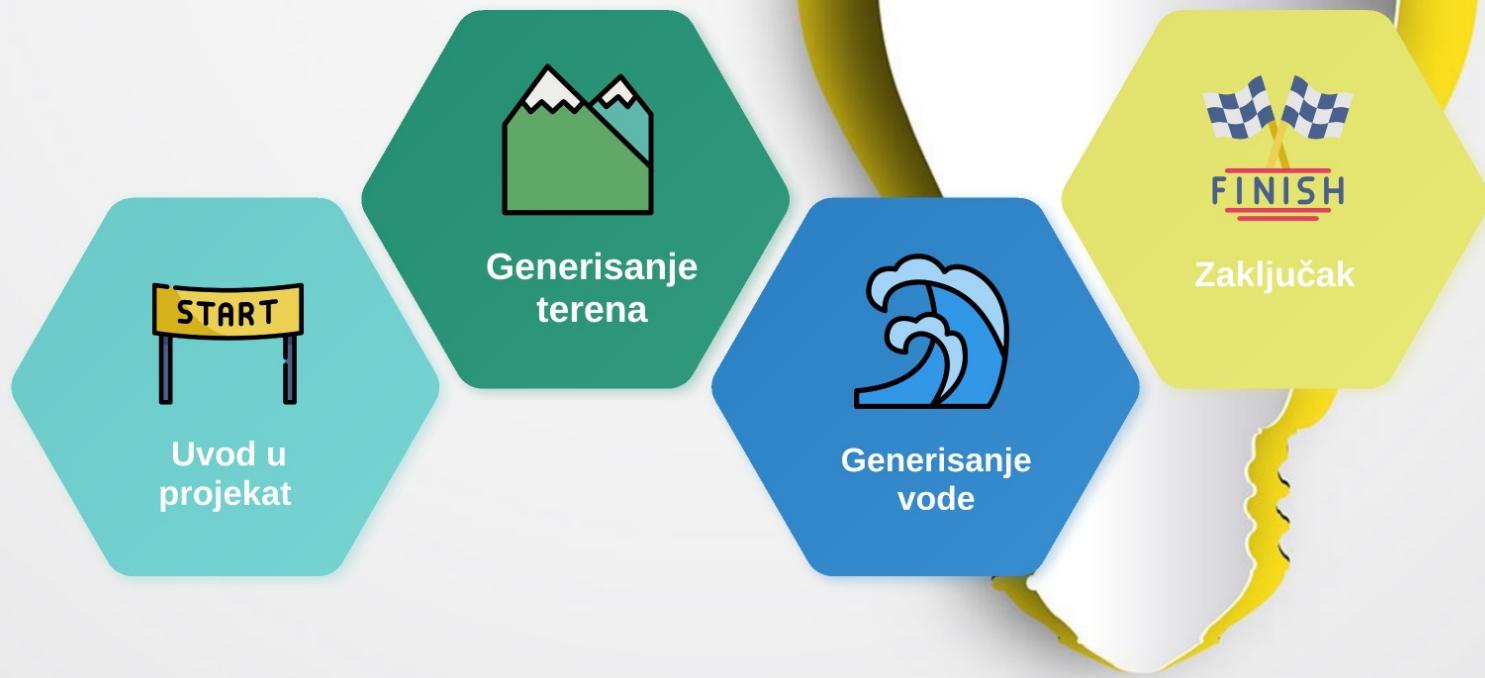


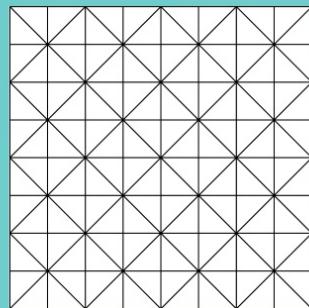
# Proceduralna grafika

Nevena Prokić SW6/2019  
Zorica Vuković SW21/2019



## Uvod u projekt

Matrix - VAO

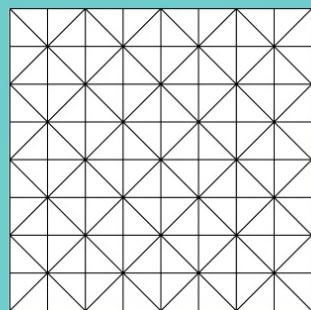


VBO Point

VBO Color

## Uvod u projekat

Matrix - VAO

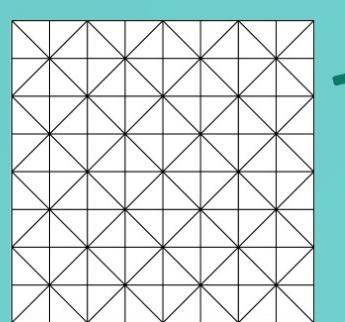


VBO Point

VBO Color

## Uvod u projekat

Matrix - VAO

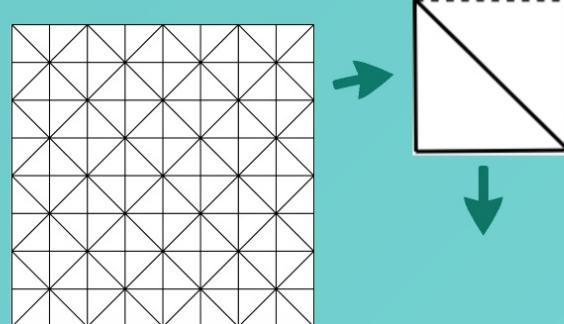


VBO Point

VBO Color

## Uvod u projekat

Matrix - VAO

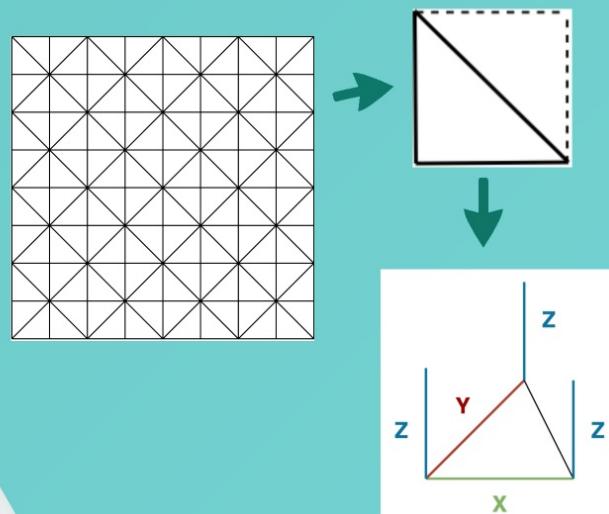


VBO Point

VBO Color

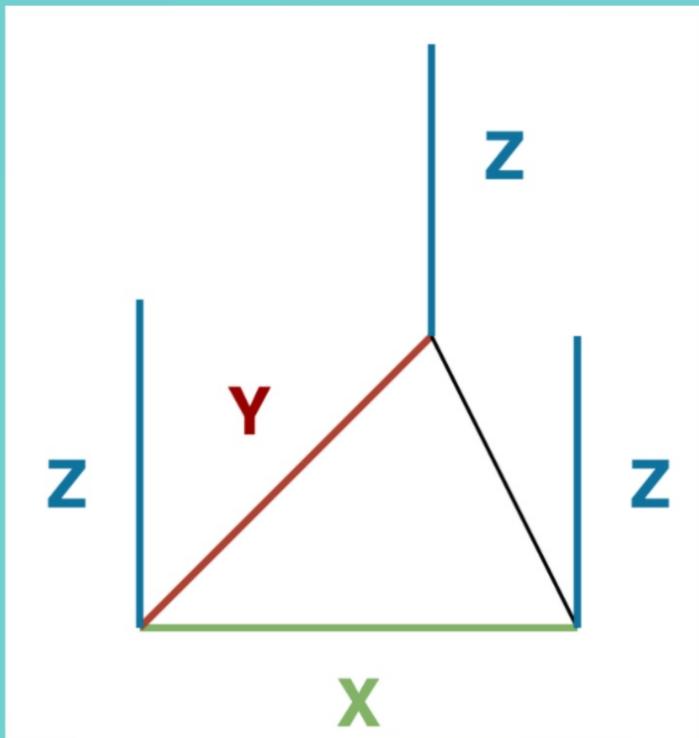
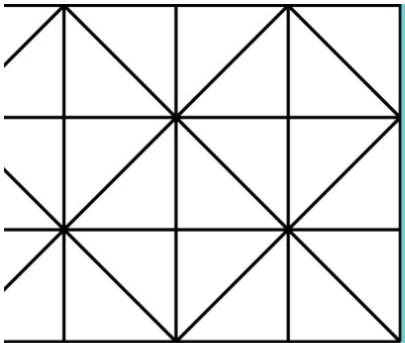
## Uvod u projekat

Matrix - VAO



VBO Point

VBO Color



V

## VBO point

X	Y	Z	VBO color
---	---	---	-----------

## VBO point

X	Y	Z	VBO color
---	---	---	-----------



## VBO point

X	Y	Z	VBO color
---	---	---	-----------



## VBO point

X	Y	Z	VBO color
---	---	---	-----------



položaj tačke u  
matrici

## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici

## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici

visina

## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici



## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici



## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici



RGB predstava  
- boja tačke

## VBO point

X	Y	Z	VBO color
---	---	---	-----------

položaj tačke u  
matrici

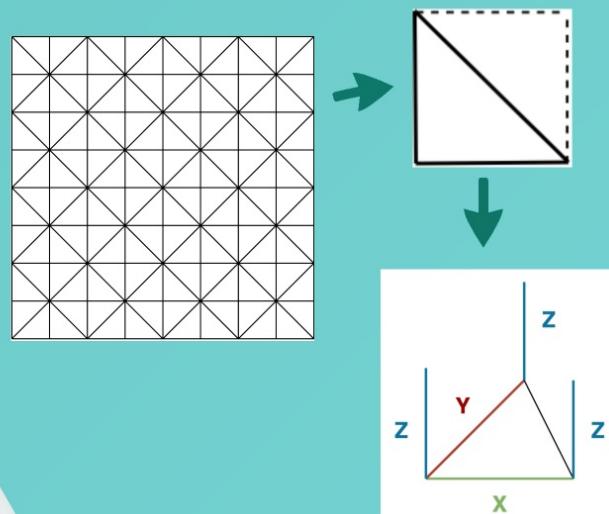


RGB predstava  
- boja tačke



## Uvod u projekat

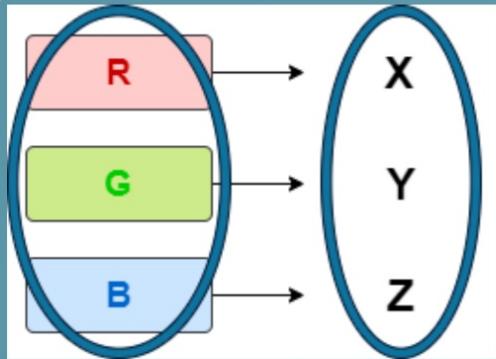
Matrix - VAO



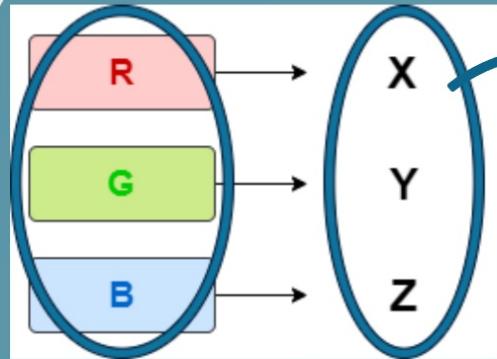
VBO Point

VBO Color

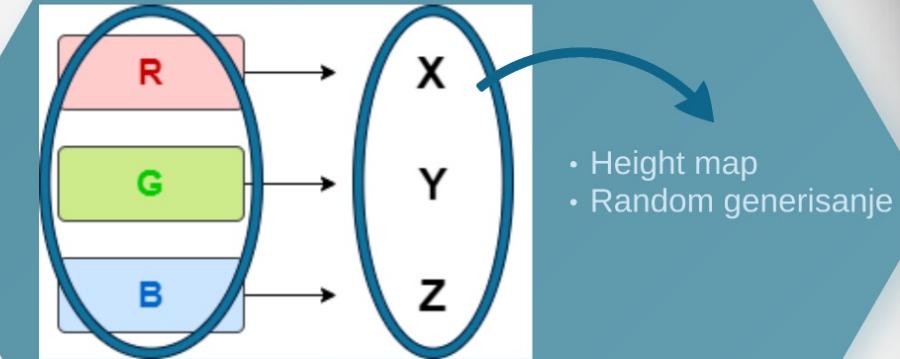
## VBO Color



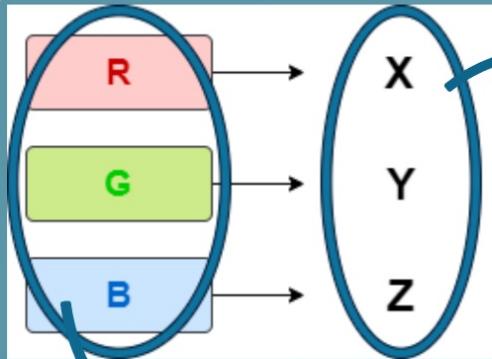
## VBO Color



## VBO Color

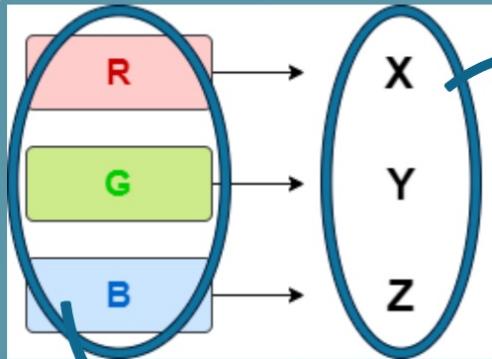


## VBO Color



- Height map
- Random generisanje

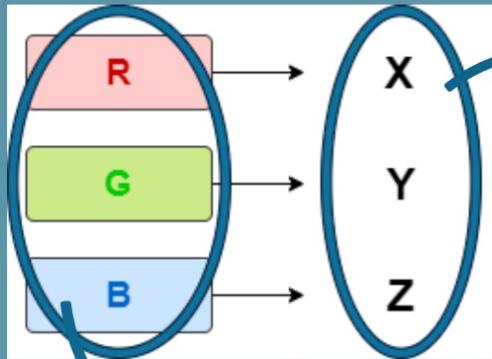
## VBO Color



- Height map
- Random generisanje

.txt file

## VBO Color



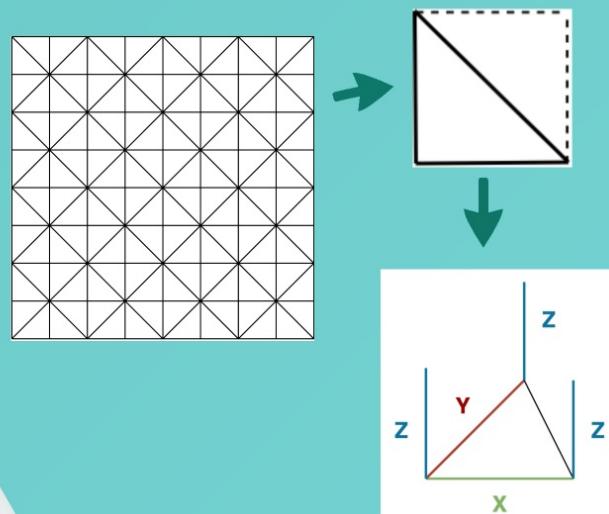
- Height map
- Random generisanje

.txt file



## Uvod u projekat

Matrix - VAO

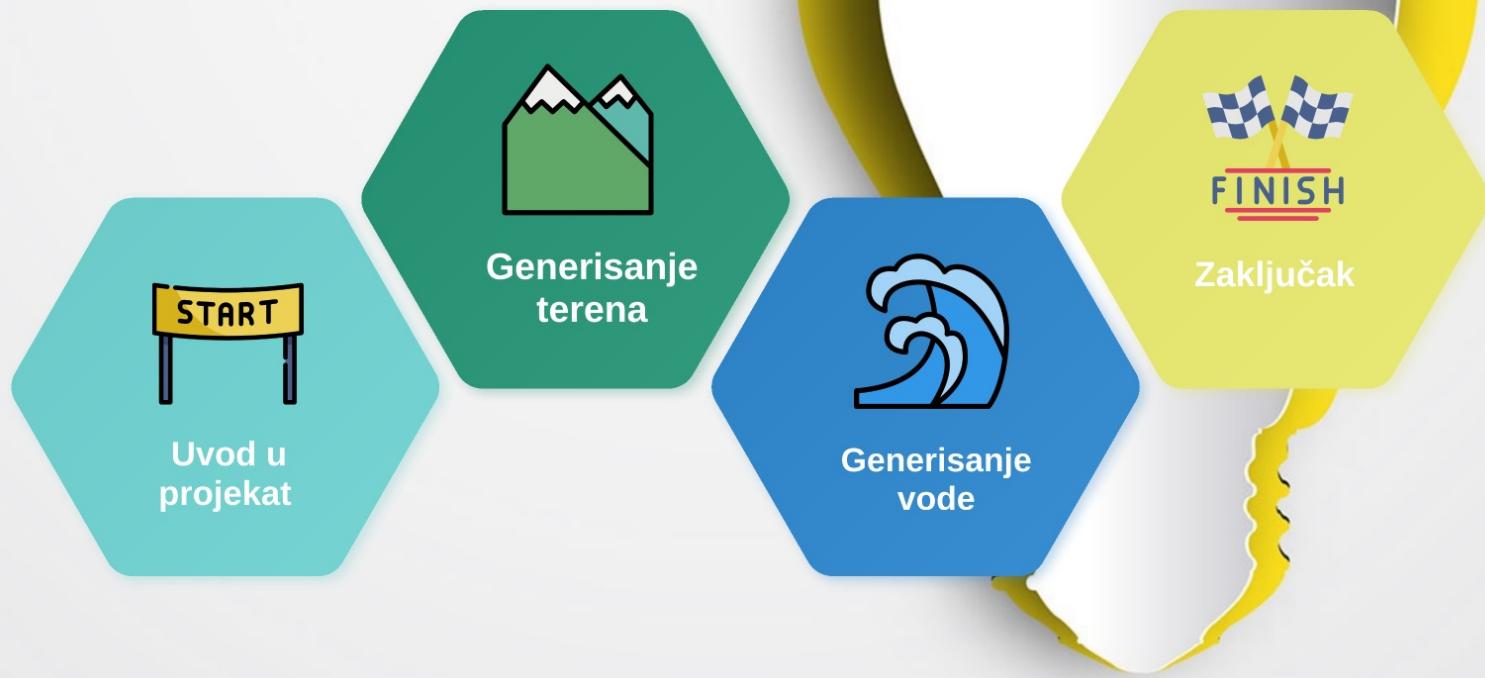


VBO Point

VBO Color

# Proceduralna grafika

Nevena Prokić SW6/2019  
Zorica Vuković SW21/2019



# Teren



Progres

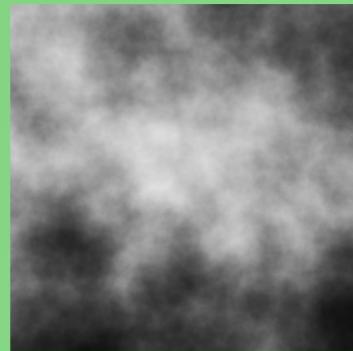
Height  
map

Random  
generisanje

Spline

Smooth

Prikaz height mape



# Teren



Progres

Height  
map

Random  
generisanje

Spline

Smooth

Radnom vrednosti



**Radnom vrednosti**



Radnom vrednosti



Perlin noise - [-1,1]



Radnom vrednosti



Perlin noise - [-1,1]



Radnom vrednosti



Perlin noise - [-1,1]

✗ neprirodne strmine

Radnom vrednosti



Perlin noise - [-1,1]

✗ neprirodne strmine



Radnom vrednosti



Perlin noise - [-1,1]

 neprirodne strmine



Radnom vrednosti



Perlin noise - [-1,1]

neprirodne strmine



Susedi

Radnom vrednosti



Perlin noise - [-1,1]

neprirodne strmine



Susedi



Radnom vrednosti



Perlin noise - [-1,1]

 neprirodne strmine



Susedi



Radnom vrednosti

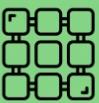


Perlin noise - [-1,1]

neprirodne strmine



Susedi



$Z \text{ koord} * \text{maks visina terena}$

# Teren



Smooth

Height  
map

Random  
generisanje

Progres

Spline

## Posmatranje suseda



! Drugačije generisanje  
visine za ivice matrice

# Teren



Smooth

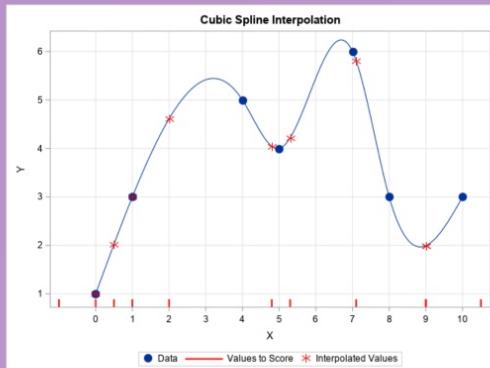
Height  
map

Random  
generisanje

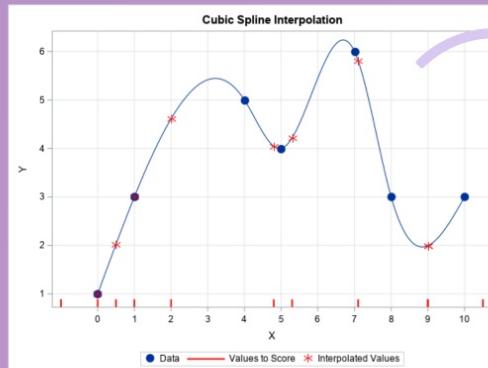
Progres

Spline

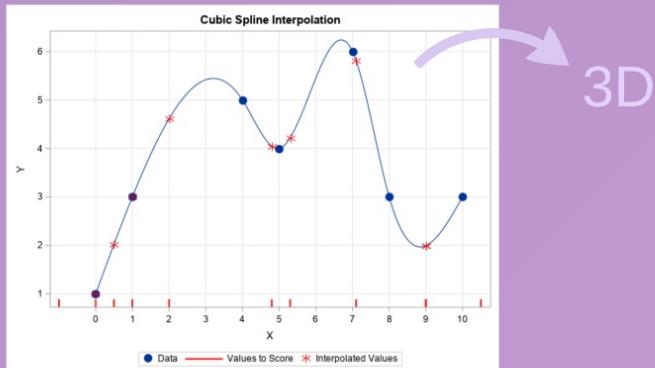
# Interpolacija tačaka



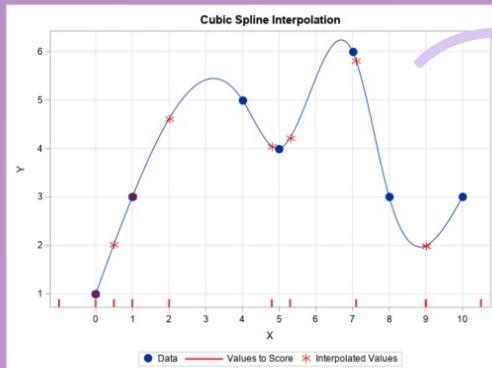
# Interpolacija tačaka



# Interpolacija tačaka

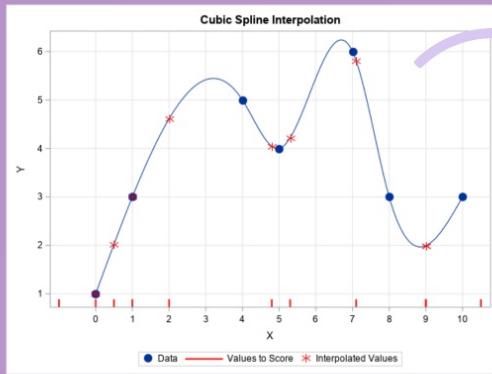


# Interpolacija tačaka



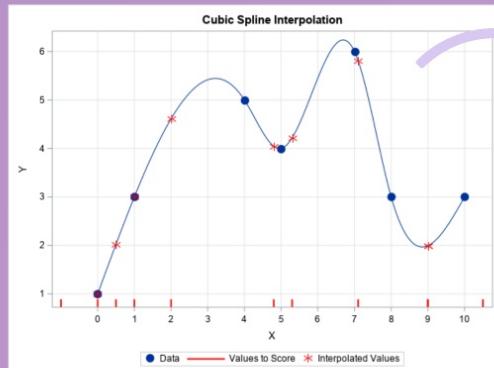
3D  
interpolacija po:  
X koordinati  
Y koordinati

# Interpolacija tačaka



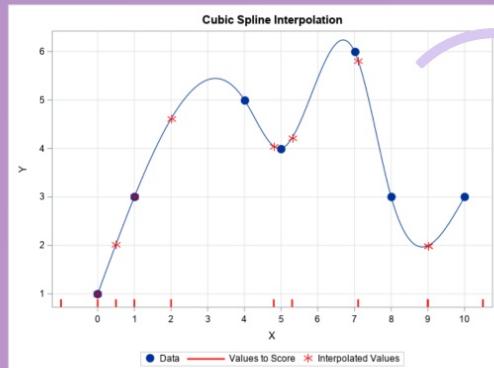
3D  
interpolacija po:  
X koordinati  
Y koordinati

# Interpolacija tačaka



3D  
interpolacija po:  
X koordinati  
Y koordinati

# Interpolacija tačaka



3D  
interpolacija po:  
X koordinati  
Y koordinati

$$X + Y = Z$$

# Teren



Smooth

Height  
map

Random  
generisanje

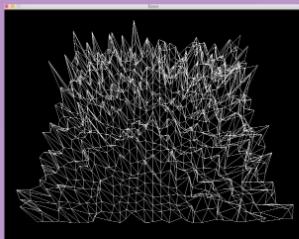
Progres

Spline

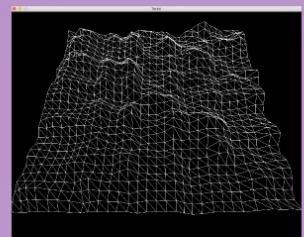
# Progres



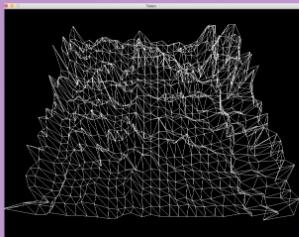
Random vrednost



Perlin noise



Smooth



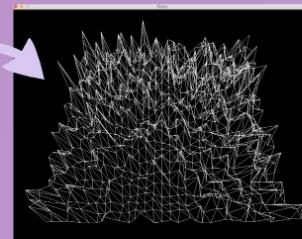
Spline

Konačni rezultat

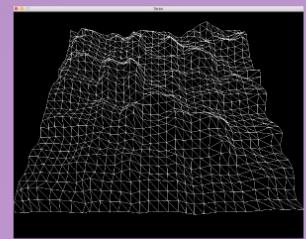
## Progres



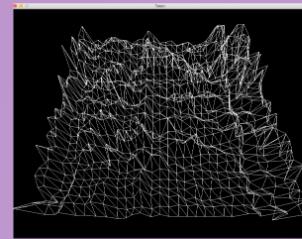
Random vrednost



Perlin noise



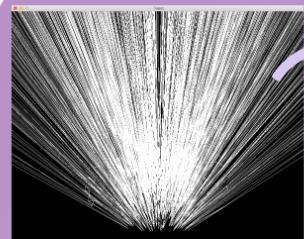
Smooth



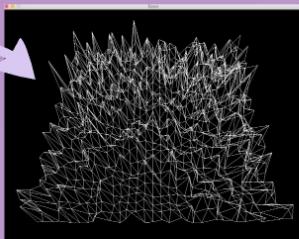
Spline

Konačni rezultat

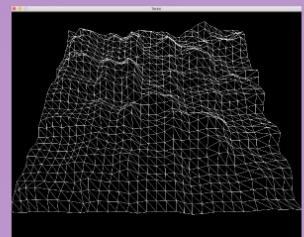
## Progres



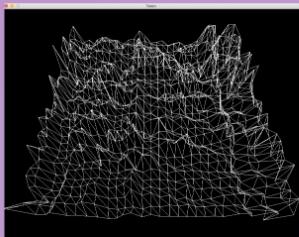
Random vrednost



Perlin noise



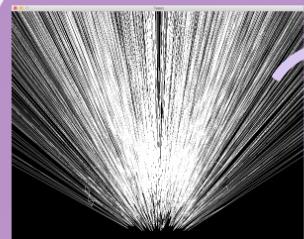
Smooth



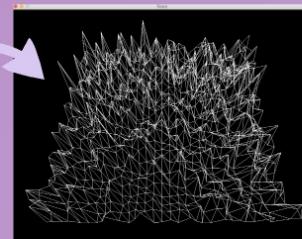
Spline

Konačni rezultat

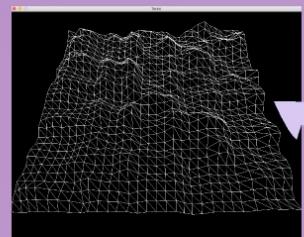
# Progres



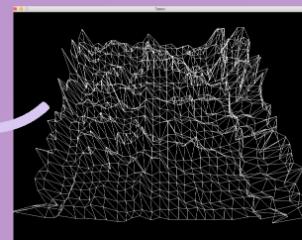
Random vrednost



Perlin noise



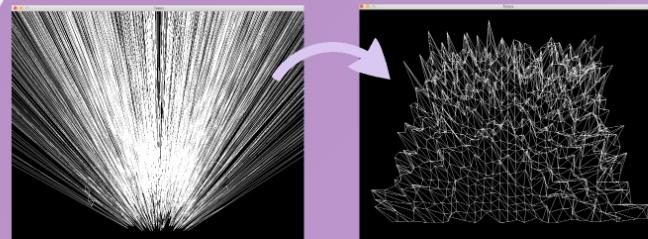
Smooth



Spline

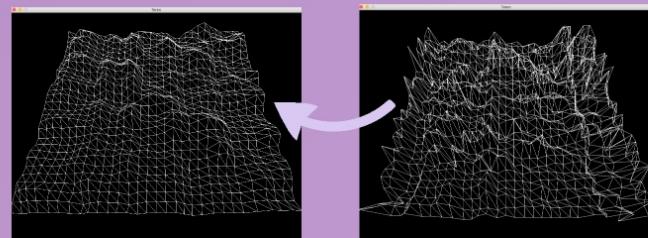
Konačni rezultat

## Progres



Random vrednost

Perlin noise



Smooth

Spline

Konačni rezultat

# Teren



Progres

Height  
map

Random  
generisanje

Spline

Smooth

# Proceduralna grafika

Nevena Prokić SW6/2019  
Zorica Vuković SW21/2019



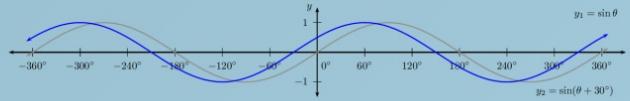
## Voda



Sinusno  
generisanje

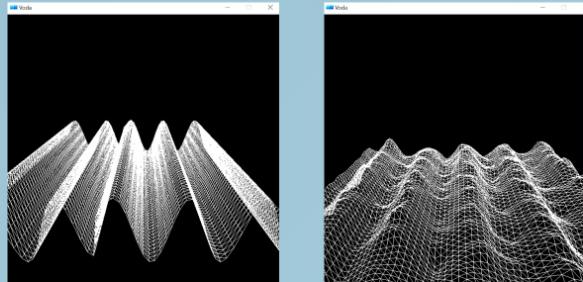
DUDV mapa

## Sinsusno generisanje

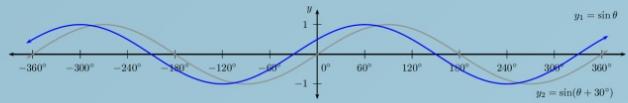


+

random deljenje x  
koordinate

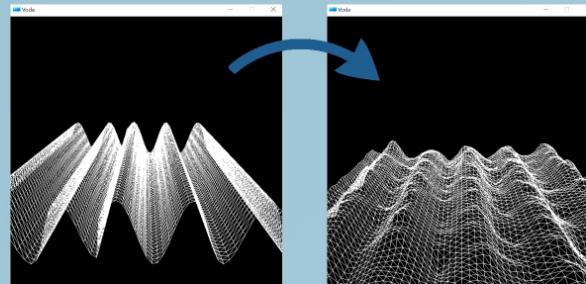


## Sinsusno generisanje



+

random deljenje x  
koordinate



## Voda

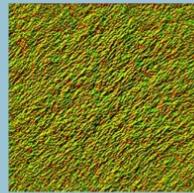


Sinusno  
generisanje

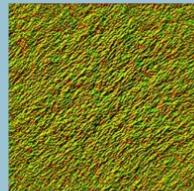
DUDV mapa

## DuDv mape

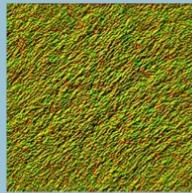
## DuDv mape



## DuDv mape

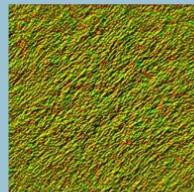


## DuDv mape



prikaz DuDv mape

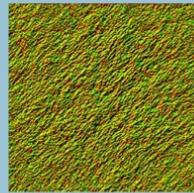
## DuDv mape



prikaz DuDv mape

- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

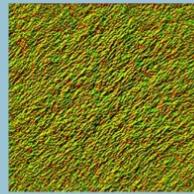
## DuDv mape



prikaz DuDv mape

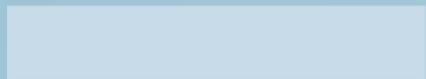
- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

## DuDv mape

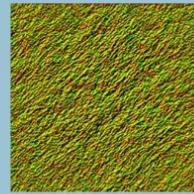


- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape



## DuDv mape

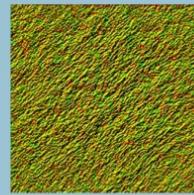


- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape

Refleksija i refrakcija

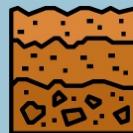
## DuDv mape



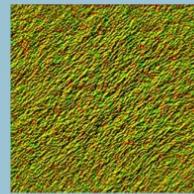
- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape

Refleksija i refrakcija



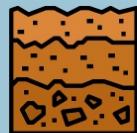
## DuDv mape



- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

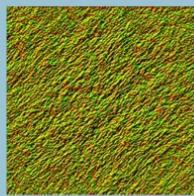
prikaz DuDv mape

Refleksija i refrakcija



+

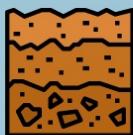
## DuDv mape



- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape

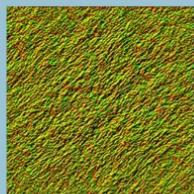
Refleksija i refrakcija



+



## DuDv mape



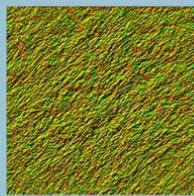
- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape

Refleksija i refrakcija



## DuDv mape



- Viši nivo detalja
- Efekat blagog talasanja
- Dominantne boje - crvena i zelena

prikaz DuDv mape

Refleksija i refrakcija



## Voda



Sinusno  
generisanje

DUDV mapa

# Proceduralna grafika

Nevena Prokić SW6/2019  
Zorica Vuković SW21/2019



Teren -  
Height mape

## Zaključak



Pygame



- Korisnički interfejs
- Prozor prikaza terena i vode

Open GL



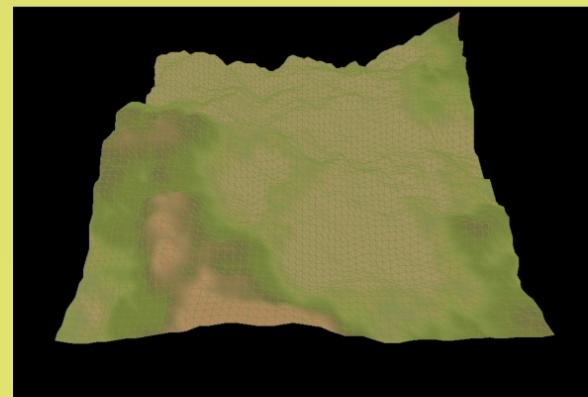
- IsCRTavanje linija i površina
- Prikaz boja
- Rotiranje, translacija i perspektiva

Voda -  
Sinusno  
generisanje

Teren -  
Random  
generisanje

Voda i teren

### Prikaz terena - Height mape



Teren -  
Height mape

## Zaključak



Pygame



- Korisnički interfejs
- Prozor prikaza terena i vode

Open GL



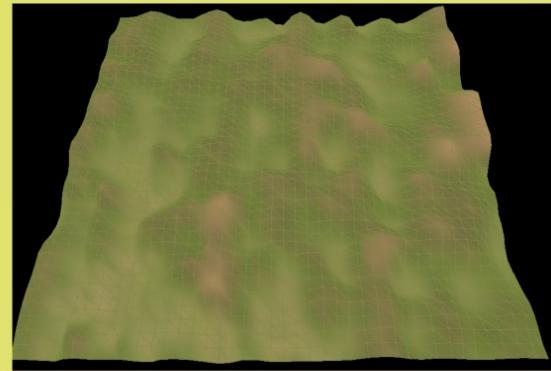
- IsCRTavanje linija i površina
- Prikaz boja
- Rotiranje, translacija i perspektiva

Voda -  
Sinusno  
generisanje

Teren -  
Random  
generisanje

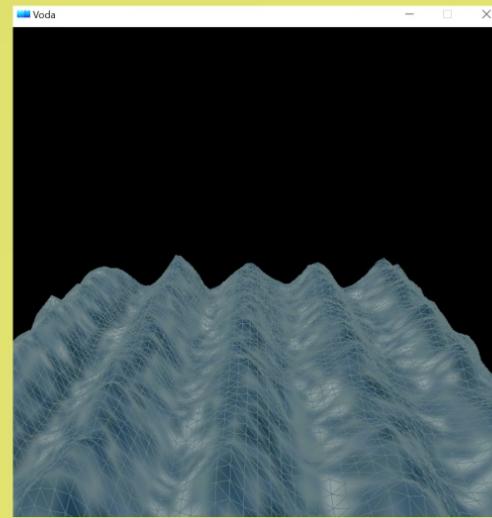
Voda i teren

Prikaz terena -  
random generisanje





## Prikaz talasanja vode





### Prikaz terena i vode



Teren -  
Height mape

## Zaključak



Pygame



- Korisnički interfejs
- Prozor prikaza terena i vode

Open GL



- IsCRTavanje linija i površina
- Prikaz boja
- Rotiranje, translacija i perspektiva

Voda -  
Sinusno  
generisanje

Teren -  
Random  
generisanje

Voda i teren

# Proceduralna grafika

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