

# in2

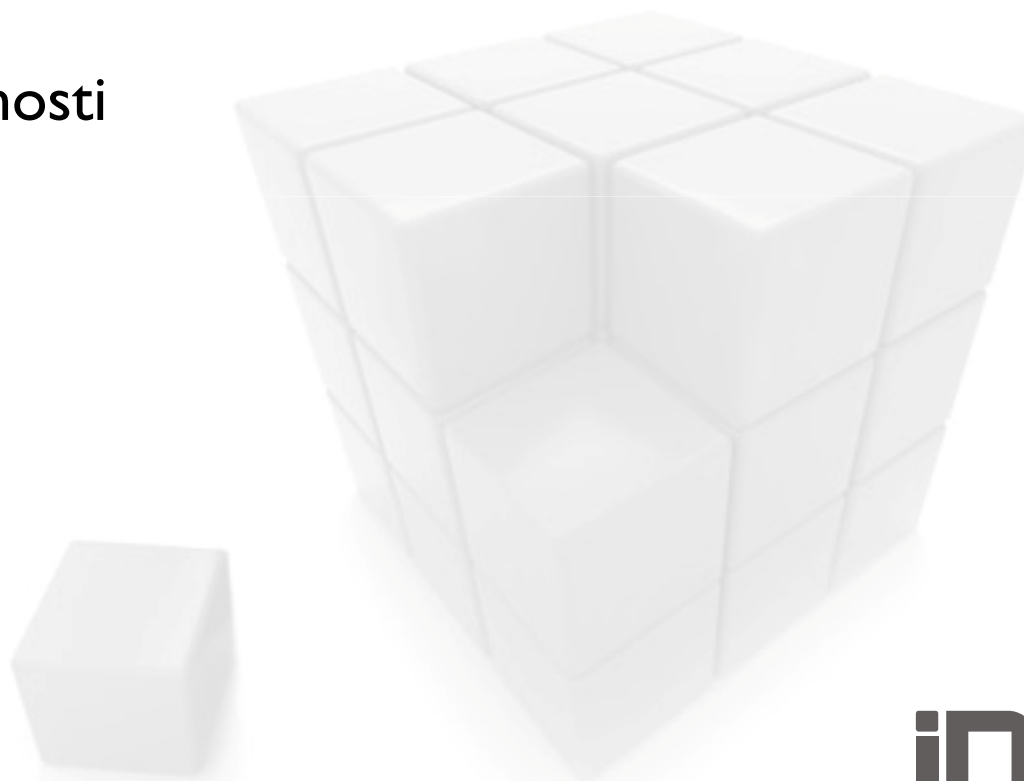
## Usporedba funkcionalnosti GDAL-a i Oracle GeoRastera

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listopad 2014.



# Sadržaj

- ❑ Uvod
- ❑ GDAL
- ❑ Oracle GeoRaster
- ❑ Usporedba funkcionalnosti
- ❑ Zaključak
- ❑ Pitanja



# Uvod

## ❑ Rasterski podaci

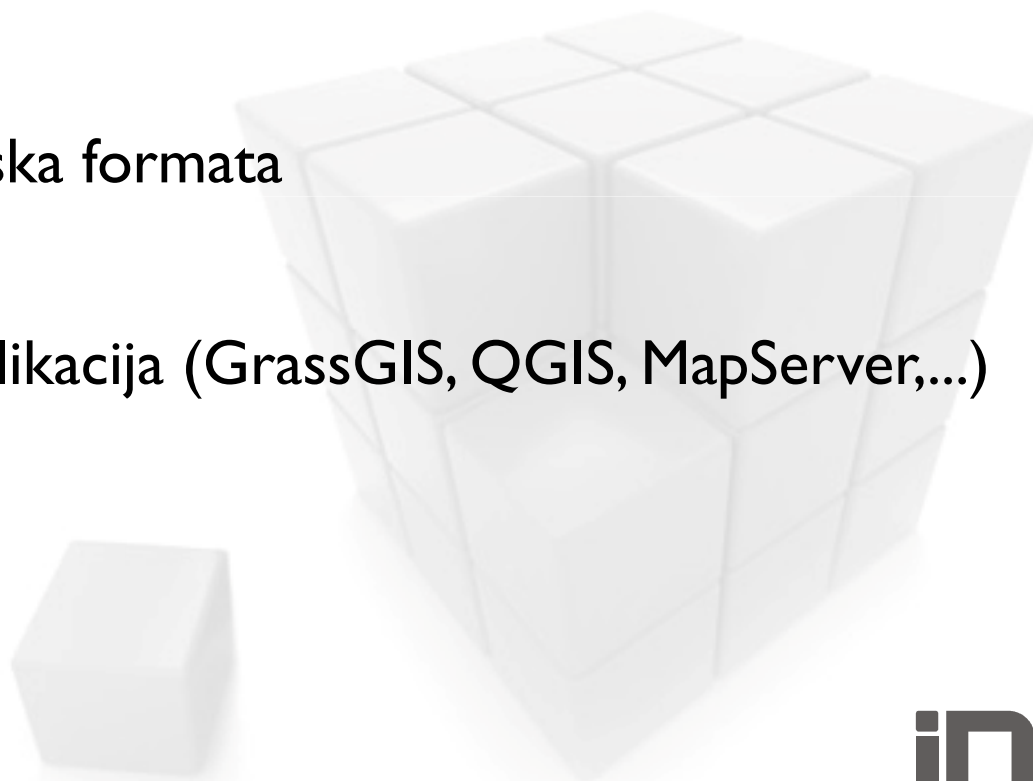
- Ortofoto, digitalizirane karte i planovi
- Veličina od MB do TB



- ❑ „Spora” obrada zbog veličine podataka
- ❑ Razni formati na datotečnom sustavu (tiff, png,..), ArcGIS geodatabase, relacijske BP (Oracle GeoRaster, Postgis Raster, Rasterlite)

# GDAL

- ❑ GDAL – Library za obradu rasterskih i vektorskih podataka
  - GDAL – rasterski podaci
  - OGR – vektorski podaci
  
- ❑ Podrška za 133 rasterska formata
  
- ❑ Koristi ga velik broj aplikacija (GrassGIS, QGIS, MapServer,...)



# GDAL

## □ API

- C, C++, Python, Java, C#, ..

## □ Command line tools

- gdalinfo
- gdal\_translate
- gdaladdo
- gdalwarp,
- ...

```
public class Main {  
    public static void main(String[] args) {  
        gdal.AllRegister();  
        try{  
            Dataset dataset = gdal.Open("C:\\Users\\kresimirho\\Desktop\\georaster\\file\\test.tif");  
            String projection = dataset.GetProjectionRef();  
            double[] geoTransform = dataset.GetGeoTransform();  
            double width = dataset.GetRasterXSize();  
            double height = dataset.GetRasterYSize();  
            System.out.println(projection);  
            System.out.println(getWkt(geoTransform, width, height));  
            dataset.delete();  
        } catch(Exception e){  
            e.printStackTrace();  
        }  
    }  
  
    public static String getWkt(double[] args, double width, double height) {  
        Double minx = args[0];  
        Double miny = args[3] + width * args[4] + height * args[5];  
        Double maxx = args[0] + width * args[1] + height * args[2];  
        Double maxy = args[3];  
        String minX = minx.toString().replace('.', ',');  
        String minY = miny.toString().replace('.', ',');  
        String maxX = maxx.toString().replace('.', ',');  
        String maxY = maxy.toString().replace('.', ',');  
        String wkt = "POLYGON ((" +  
            minX + " " + maxY +  
            ", " +  
            maxX + " " + maxY +  
            ", " +  
            maxX + " " + minY +  
            ", " +  
            minX + " " + minY +  
            ", " +  
            minX + " " + maxY +  
            "))";  
        return wkt;  
    }  
}
```

# Oracle GeoRaster

## □ Dodatak na Oracle Spatial and Graph

## □ Definira model za pohranu rasterskih podataka u relacijsku bazu

- SDO\_GEORASTER
- SDO\_RASTER

```
CREATE TABLE podaci  
( georasterID NUMBER PRIMARY KEY  
, naziv VARCHAR2(50)  
, image sdo_georaster);
```

```
CREATE TABLE podaciRDT  
( rid NUMBER  
, pyramidLevel NUMBER  
, bandBlockNumber NUMBER  
, rowBlockNumber NUMBER  
, columnBlockNumber NUMBER  
, blockMBR SDO_GEOMETRY  
, rasterBlock BLOB  
, CONSTRAINT podacirdt_pk  
PRIMARY KEY(rid, pyramidLevel, bandBlockNumber, rowBlockNumber, columnBlockNumber)  
)  
LOB (rasterblock) STORE AS SECUREFILE(cache);
```

# Oracle GeoRaster

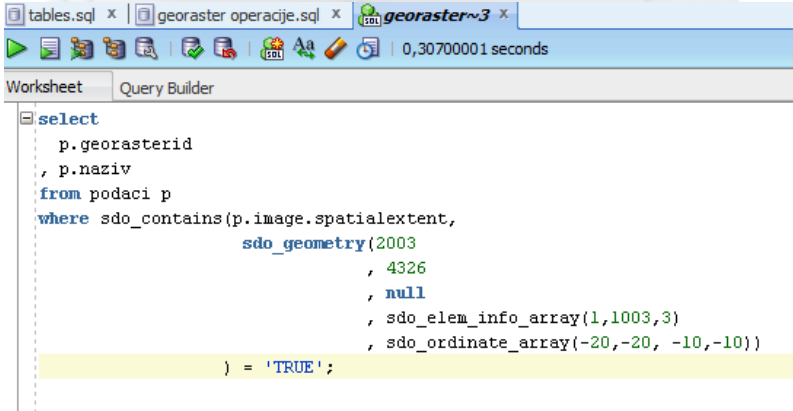
## ❑ Učitavanje podataka

- SDO\_GEOR.importForm()
- GeoRasterViewer – dolazi s examples instalacijom
- GDAL – potreban gdal\_GEOR plugin

xtiff-jai.jar  
geotiff-jai.jar

## ❑ Prostorni indeks na spatialExtent-u rastera

## ❑ Upiti s prostornim operatorima

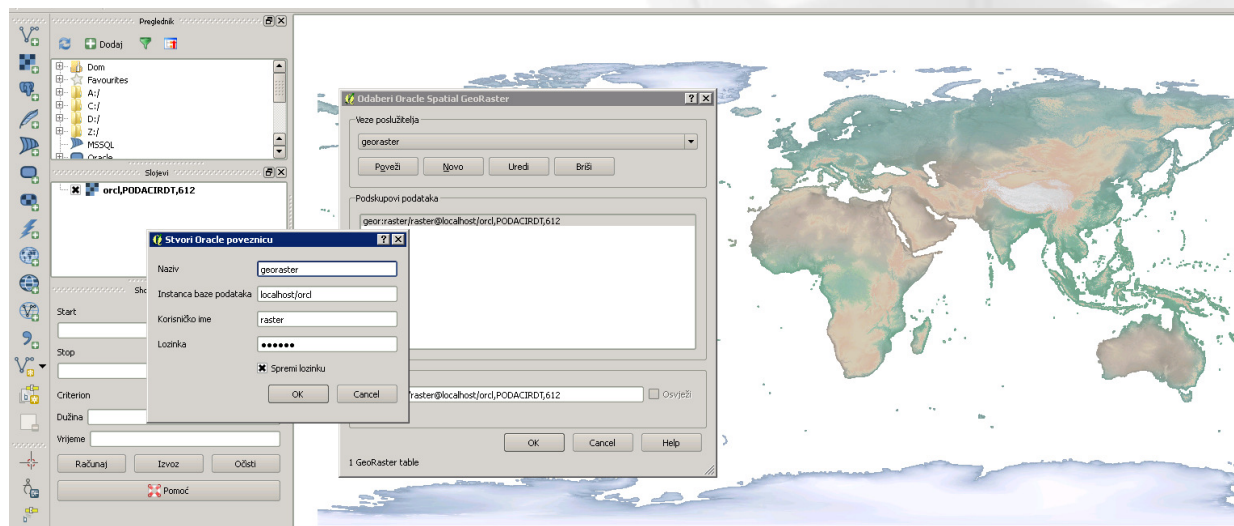


```
select
  p.georasterid
, p.naziv
from podaci p
where sdo_contains(p.image.spatialextent,
  sdo_geometry(2003
    , 4326
    , null
    , sdo_elem_info_array(1,1003,3)
    , sdo_ordinate_array(-20,-20, -10,-10))
) = 'TRUE';
```

# Oracle GeoRaster

## □ Pregled podataka

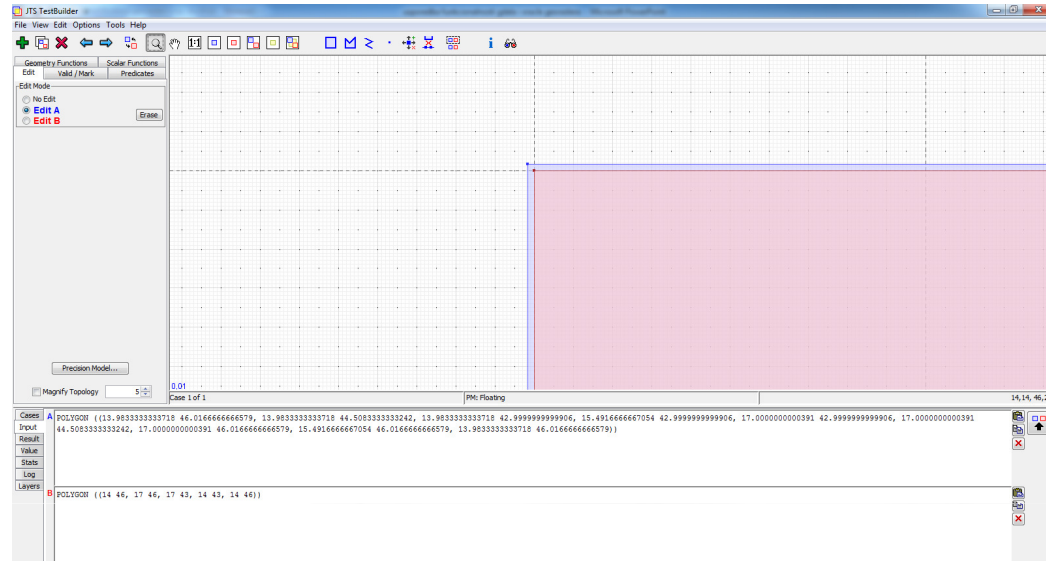
- GeoRasterViewer
- Fusion Middleware MapViewer
- Export u drugi format
- Ostali alati (QGIS,...)





# Usporedba funkcionalnosti

## ❑ Subset rastera



```
gdalwarp -t_srs EPSG:4326 -te 14 43 17 46 hyp_hr.tif hrv.tif
```

```
...  
sdo_geor.subset(gr1  
  , sdo_geometry( 2003  
    , 4326  
    , null  
    , sdo_elem_info_array(1,1003,3)  
    , sdo_ordinate_array(14,43, 17,46))  
  , '1-3'  
  , null  
  , gr2);  
...
```

# Usporedba funkcionalnosti

## ❑ Prebacivanje u drugu projekciju

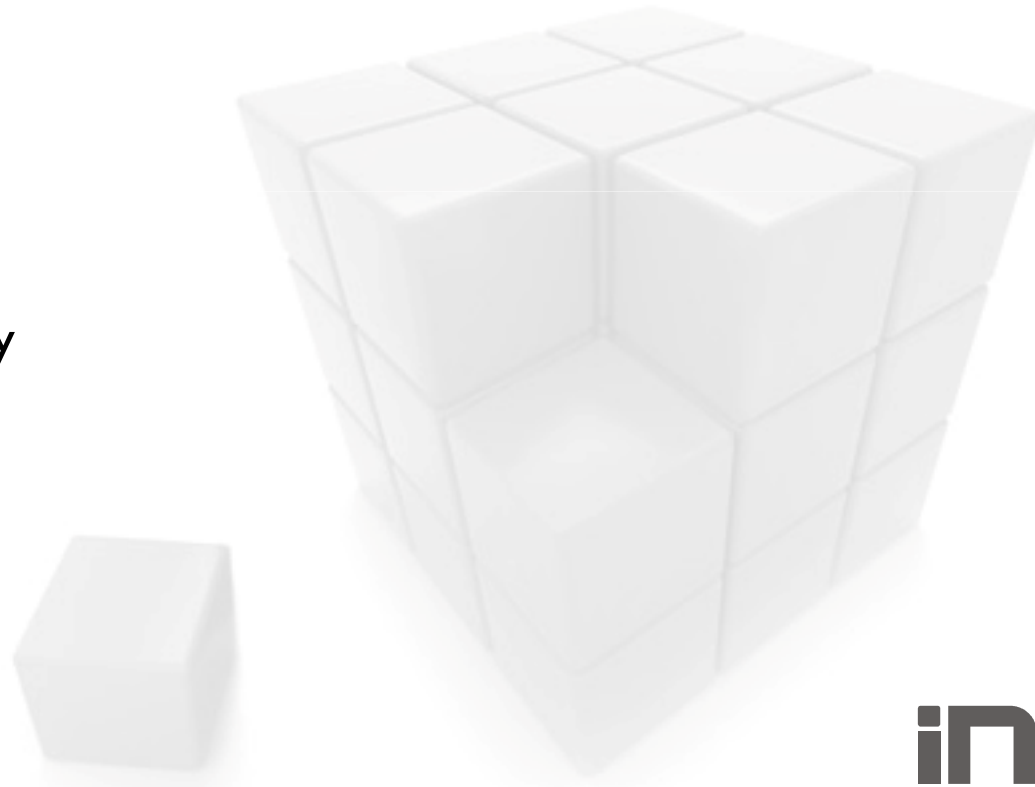
- `gdal_translate -of Gtiff -a_srs EPSG:3765 -co "TFW=YES,, input.tif output.tif`
  - `gdalwarp` – prebacivanje u drugi koordinatni sustav bez kreiranja novog rastera
- `sdo_geor.reproject(inRaster, 'resampling=NN', null, 3765, outRaster);`

## ❑ Kreiranje piramide/overview-a

- `sdo_geor.generatePyramid(gr, 'rLevel=5, resampling=NN');`
- `gdaladdo -r average --config COMPRESS_OVERVIEW JPEG --config PHOTOMETRIC_OVERVIEW RGB --config INTERLEAVE_OVERVIEW PIXEL hyp_hr.tif 2 4 8 16 32 64 128 256 512 1024 2048`

# Usporedba funkcionalnosti

- ❑ Georeferenciranje
  - gdal\_translate, gdalwarp
  - SDO\_GEOR.georeference
  
- ❑ Scaling
  - gdal\_translate
  - SDO\_GEOR.scaleCopy
  
- ❑ ...



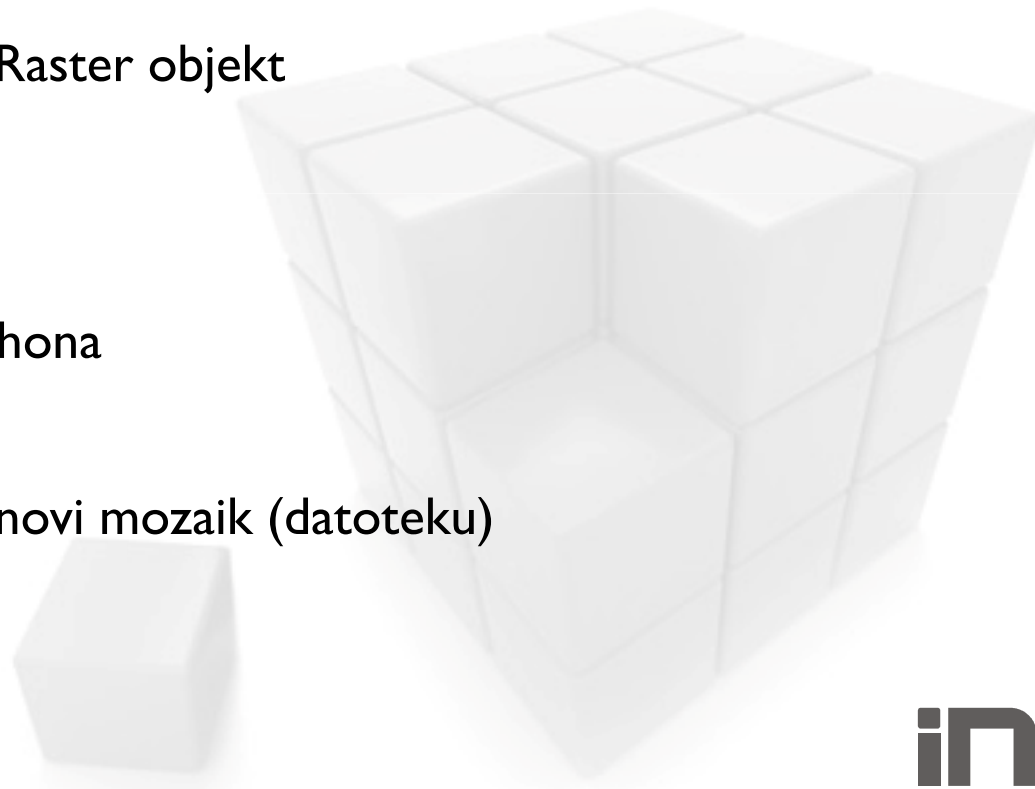
# Usporedba funkcionalnosti

## ❑ Mozaik i virtualni mozaik

- Kolekcije GeoRaster objekata
- Više tablica/view-a
- Ponašaju se kao 1 GeoRaster objekt

## ❑ GDAL mozaik

- Potrebna instalacija pythona
- `gdal_merge.py`
- Svi rasteri dodaju se u novi mozaik (datoteku)

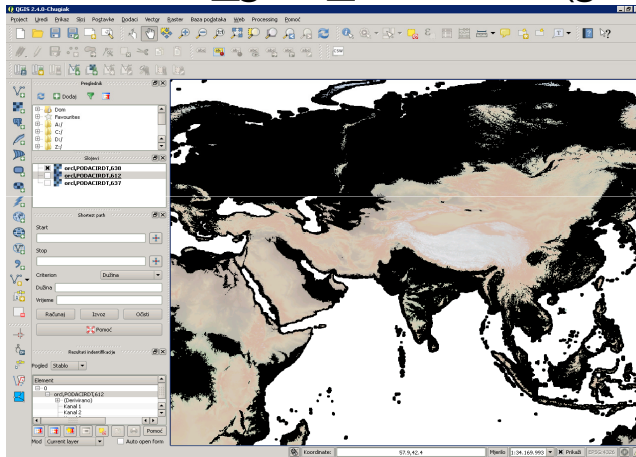


# Usporedba funkcionalnosti

## ❑ Rasterska algebra

- Kao ekstenzija za pl/sql

- `sdo_geor_ra.findcells(gr1, '{0}>180&{1}>150&{2}>150', null, gr2);`



## ❑ GDAL nudi neke mogućnosti preko API-a

- Python skripte dolaze uz instalaciju

# Usporedba funkcionalnosti

## ❑ Kompresija podataka

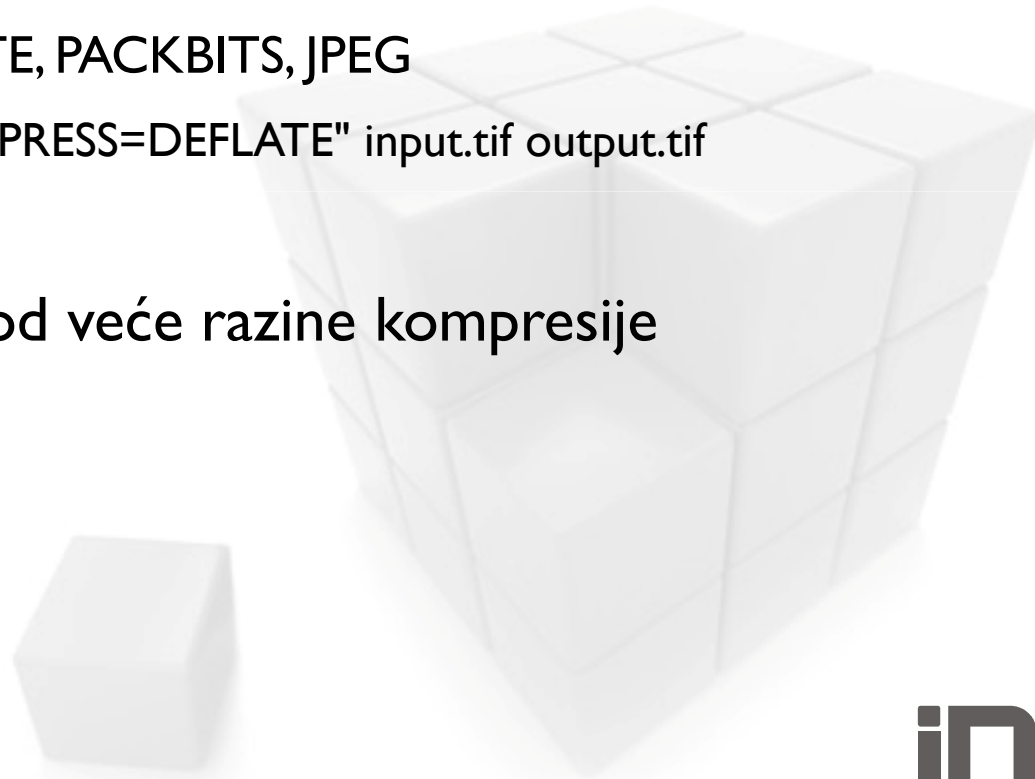
- GeoRaster – DEFLATE, JPEG

- `sdo_geor.changeFormatCopy(gr1, 'compression=DEFLATE', gr2);`

- GDAL – LZW, DEFLATE, PACKBITS, JPEG

- `gdal_translate "COMPRESS=DEFLATE" input.tif output.tif`

## ❑ Sporije procesiranje kod veće razine kompresije



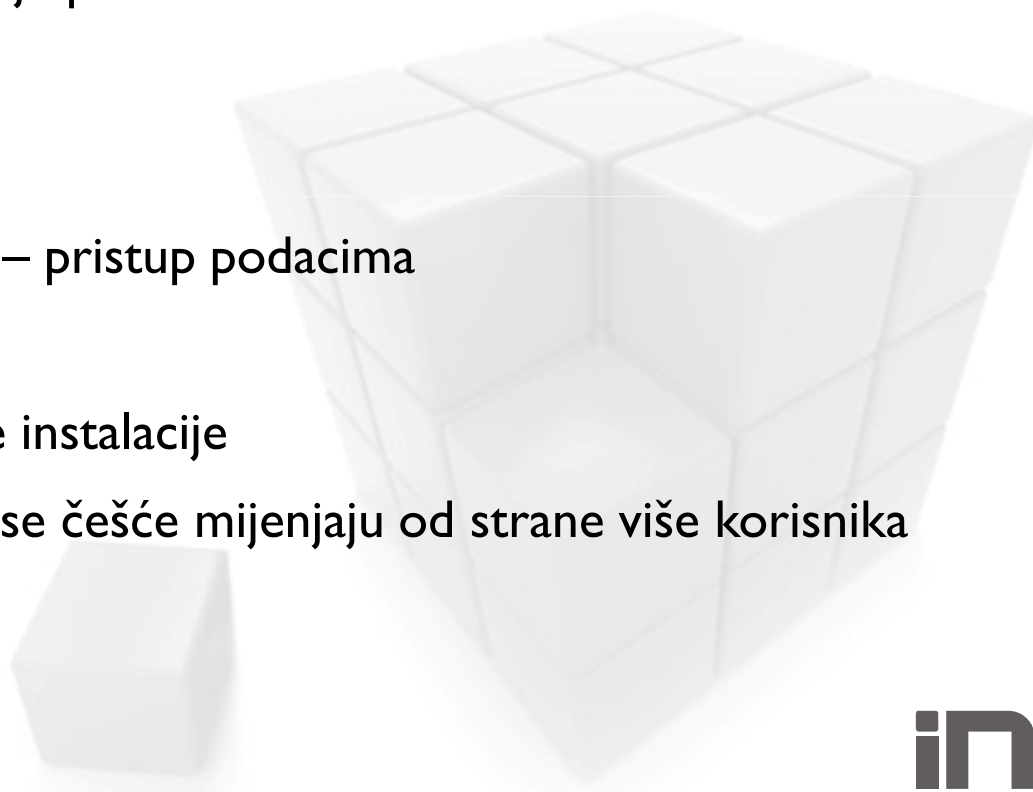
# Zaključak

## □ GDAL prednosti

- GDAL bolji za jednokratno procesiranje
- Više načina za kompresiju podataka
- API za više jezika

## □ GeoRaster prednosti

- Podaci se nalaze u bazi – pristup podacima
- Sigurnost podataka
- Nisu potrebne dodatne instalacije
- Dobro za podatke koji se češće mijenjaju od strane više korisnika



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