In [6]:
```
import arcpy
import zipfile
import requests
import io
import os
```

In [7]:
```
working_dir=r'G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb'
```

In [8]:
```
working_dir
```

Out[8]:
```
'G:\\My Drive\\GIS 5571\\Lab2.3\\Lab2.3\\Lab2.gdb'
```

Bring in Data

In [9]:
```
landuse_file = r'https://resources.gisdata.mn.gov/pub/gdrs/data/pub/us_mn_state_dnr/biota_landcover_census_of_90s/tif_biota_landcover_census_of_90s.zip'
```

In [12]:
```
landuse_actual = requests.post(landuse_file)
```

In [15]:
```
landusezipfile = zipfile.ZipFile(io.BytesIO(landuse_actual.content))
```

In [16]:
```
landusezipfile.extractall(working_dir)
```

In [ ]:
```
DEM_file = r'https://resources.gisdata.mn.gov/pub/gdrs/data/pub/us_mn_state_dnr/elev_30m_digital_elevation_model/fgdb_elev_30m_digital_elevation_model.zip'
```

In [ ]:
```
DEM_actual = requests.post(DEM_file)
```

In [ ]:
```
DEMzipfile = zipfile.ZipFile(io.BytesIO(DEM_post_request.content))
```

In [ ]:
```
DEMzipfile.extractall(working_dir)
```

Clip

In [ ]:
```
#arcpy.management.Clip("NLCD_2019_Land_Cover.tif", "566420 4876000 579000 4887420", r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\NLCD_2019_Land_Cover_Clip", None, "255", "NONE", "NO_MAINTAIN_EXTENT")
```

In [ ]:
```
#arcpy.management.Clip(r"Digital Elevation Model - 30m Resolution\Digital Elevation Model", "56420 4876000 579000 4887420", r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\landcover_census_of_the_Clip", None, "32767", "NONE", "NO_MAINTAIN_EXTENT")
```

Convert DEM to Slope

In [ ]:
```
#arcpy.ddd.Slope(r"DEM", r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Slope_digita1", "DEGREE", 1, "PLANAR", "METER")
```

Standarize Slope

In [ ]:
```
#output_raster = arcpy.ia.RasterCalculator(' "Slope_Digita1" /90'); output_raster.save(r"g:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\slope__standarized")
```

Raster Calculator: Landcover

In [ ]:
```
#Water
```

In [ ]:
```
#arcpy.ia.RasterCalculator(' "Land_Cover_Clip" == 90 or  "Land_Cover_Clip" == 95'); output_raster.save(r"g:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Water")
```

In [ ]:
```
#Farmland
```

In [ ]:
```
#arcpy.ia.RasterCalculator(' "Land_Cover_Clip" == 81 or  "Land_Cover_Clip" == 82'); output_raster.save(r"g:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Farmland")
```

In [ ]:
```
# Passable
```

In [ ]:
```
#output_raster = arcpy.ia.RasterCalculator(' ("Land_Cover_Clip"== 41) or ( "Land_Cover_Clip" ==81) or ( "Land_Cover_Clip" == 21) or ( "Land_Cover_Clip" ==23) or ( "Land_Cover_Clip" == 22) or ( "Land_Cover_Clip" ==71)'); output_raster.save(r"g:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Passable")
```

Extract by Mask

In [ ]:
```
#out_raster = arcpy.sa.ExtractByMask("Water", "Start", "INSIDE", '566420 4876000 579020 4887430 PROJCS["NAD_1983_UTM_Zone_15N",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",0.0],PARAMETER["Central_Meridian",-93.0],PARAMETER["Scale_Factor",0.9996],PARAMETER["Latitude_Of_Origin",0.0],UNIT["Meter",1.0]]'); out_raster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Extract_Land1")
```

In [ ]:
```
#out_raster = arcpy.sa.ExtractByMask("Water", "End", "INSIDE", '566420 4876000
579020 4887430 PROJCS["NAD_1983_UTM_Zone_15N",GEOGCS["GCS_North_American_198
3",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.25722210
1]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Tra
nsverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northi
ng",0.0],PARAMETER["Central_Meridian",-93.0],PARAMETER["Scale_Factor",0.9996],
PARAMETER["Latitude_Of_Origin",0.0],UNIT["Meter",1.0]]'); out_raster.save
(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\Extract_Land1")
```

Raster Calculator: Cost Surface

In [ ]:
```
#output_raster = arcpy.ia.RasterCalculator('(5 * "passable2") + (5* "Farmland
3") + (5* "Water") + (5* "slope__standarized")'); output_raster.save(r"g:\My D
rive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\cost1")
```

In [ ]:
```
#output_raster = arcpy.ia.RasterCalculator('(5 * "passable2") + (3* "Farmland
3") + (3* "Water") + (3* "slope__standarized")'); output_raster.save(r"g:\My D
rive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\cost3")
```

In [ ]:
```
#output_raster = arcpy.ia.RasterCalculator('(3 * "passable2") + (3* "Farmland
3") + (3* "Water") + (5* "slope__standarized")'); output_raster.save(r"g:\My D
rive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\cost4")
```

Cost Distance

In [ ]:
```
#out_distance_raster = arcpy.sa.CostDistance("cost1", "cost1", None, r"G:\My D
rive\GIS 5571\Lab2.3\Backlink1_1", None, None, None, None, ''); out_distance_r
aster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_2")
```

In [ ]:
```
#out_distance_raster = arcpy.sa.CostDistance("cost2", "cost2", None, r"G:\My D
rive\GIS 5571\Lab2.3\Backlink1_2", None, None, None, None, ''); out_distance_r
aster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_3")
```

In [ ]:
```
#out_distance_raster = arcpy.sa.CostDistance("cost3", "cost3", None, r"G:\My D
rive\GIS 5571\Lab2.3\Backlink1_3", None, None, None, None, ''); out_distance_r
aster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_4")
```

Cost Path

In [ ]:
```
#out_distance_raster = arcpy.sa.CostDistance("cost1", "cost1", None, r"G:\My D
rive\GIS 5571\Lab2.3\Backlink1_1", None, None, None, None, ''); out_distance_r
aster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_2")
```

In [ ]:
```
# out_distance_raster = arcpy.sa.CostDistance("cost2", "cost2", None, r"G:\My
 Drive\GIS 5571\Lab2.3\Backlink1_2", None, None, None, None, ''); out_distance
_raster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_3")
```

In [ ]:
```
#out_distance_raster = arcpy.sa.CostDistance("cost3", "cost3", None, r"G:\My D
rive\GIS 5571\Lab2.3\Backlink1_3", None, None, None, None, ''); out_distance_r
aster.save(r"G:\My Drive\GIS 5571\Lab2.3\Lab2.3\Lab2.gdb\CostD1_4")
```