DATA INTEGRATION- WEBAPP- RURALGIS

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INVESTIGATION OF THE CHARACTERISTICS OF SURFACE SHAPES IN RURAL ENVIRONMENT BASED ON POINT CLOUDS AND REMOTE SENSING DATA

PROJECT ID: 2019-2.1.11-TÉT-2020-00171

3RD WORKSHOP

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Obuda University, Alba Regia Technical Faculty, Institute of Science and Software Technology

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Data Sources

- large scale land use maps;
- soil structure data;
- WorldView, RADARSAT, Landsat, Lidar 3D point cloud data;
- relevant Chinese satellite imagery (Sunflower satellite data);
- basic data on the agricultural environment (e.g. land use, topography and other official maps and data related to land), above ground vegetation data (e.g. vegetation index);
- plant phenology data, agricultural surface vegetation data;
- moisture conditions of agricultural land;
- research results, method descriptions (pdf documents);
- Metadata – keywords.

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Main Concept

- Three side of app
  - Data sources
  - Methodology
  - Results
- Authentication and authorization
  - Read descriptions and keywords for guests
  - Modify data, download sources for participants

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Rights management - User groups and rights

- ID (**User_ID**)
- **User_firstname, User_middlename, User_surname**
- **User_username**
- **User_password**
- **User_email**
- **User_registration_date**
- **User_activation**
- User_group
- Country
- Institution
- User_group_description

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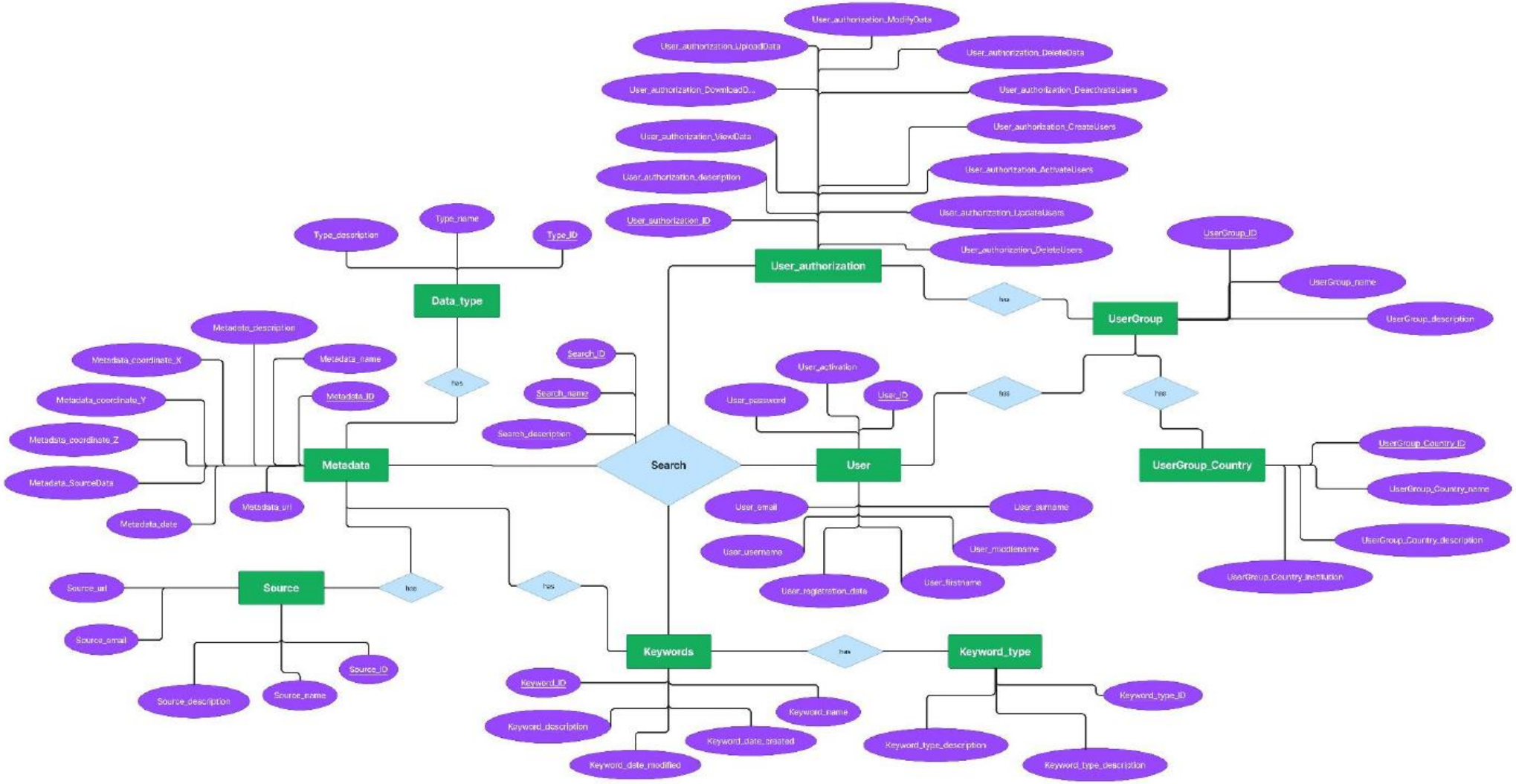
ER Model


User_authorization_ModifyData
User_authorization_UploadData
User_authorization_DeleteData
User_authorization_DownloadD...
User_authorization_DeactivateUsers
User_authorization_CreateUsers
User_authorization_ViewData
User_authorization_description
User_authorization_ActivateUsers
User_authorization_ID
User_authorization_UpdateUsers
User_authorization_DeleteUsers
User_authorization
Type_name
Type_description
Type_ID
Data_type
has
UserGroup_ID
UserGroup_name
UserGroup_description
UserGroup
Metadata_description
Metadata_coordinate_X
Metadata_name
Metadata_coordinate_Y
Metadata_ID
Metadata_coordinate_Z
Metadata_SourceData
Metadata_date
Metadata_url
Metadata
Search_ID
Search_name
Search_description
Search
User_activation
User_password
User_ID
User
UserGroup_Country
UserGroup_Country_ID
UserGroup_Country_name
UserGroup_Country_description
UserGroup_Country_institution
User_email
User_surname
User_username
User_middlename
User_registration_data
User_firstname
Source_url
Source
Source_email
Source_ID
Source_description
Source_name
Keywords
Keyword_type
Keyword_ID
Keyword_name
Keyword_description
Keyword_date_created
Keyword_date_modified
Keyword_type_ID
Keyword_type_description
Keyword_type_description

Rights

	View Data	Download Data	Upload Data	Modify Data	Delete Data	CreateUsers	Activate Users	Deactivate Users	Delete Users	Update Users
Admin	X	X	X	X	X	X	X	X	X	X
Guest	X									
Participant	X	X	X	X	X					

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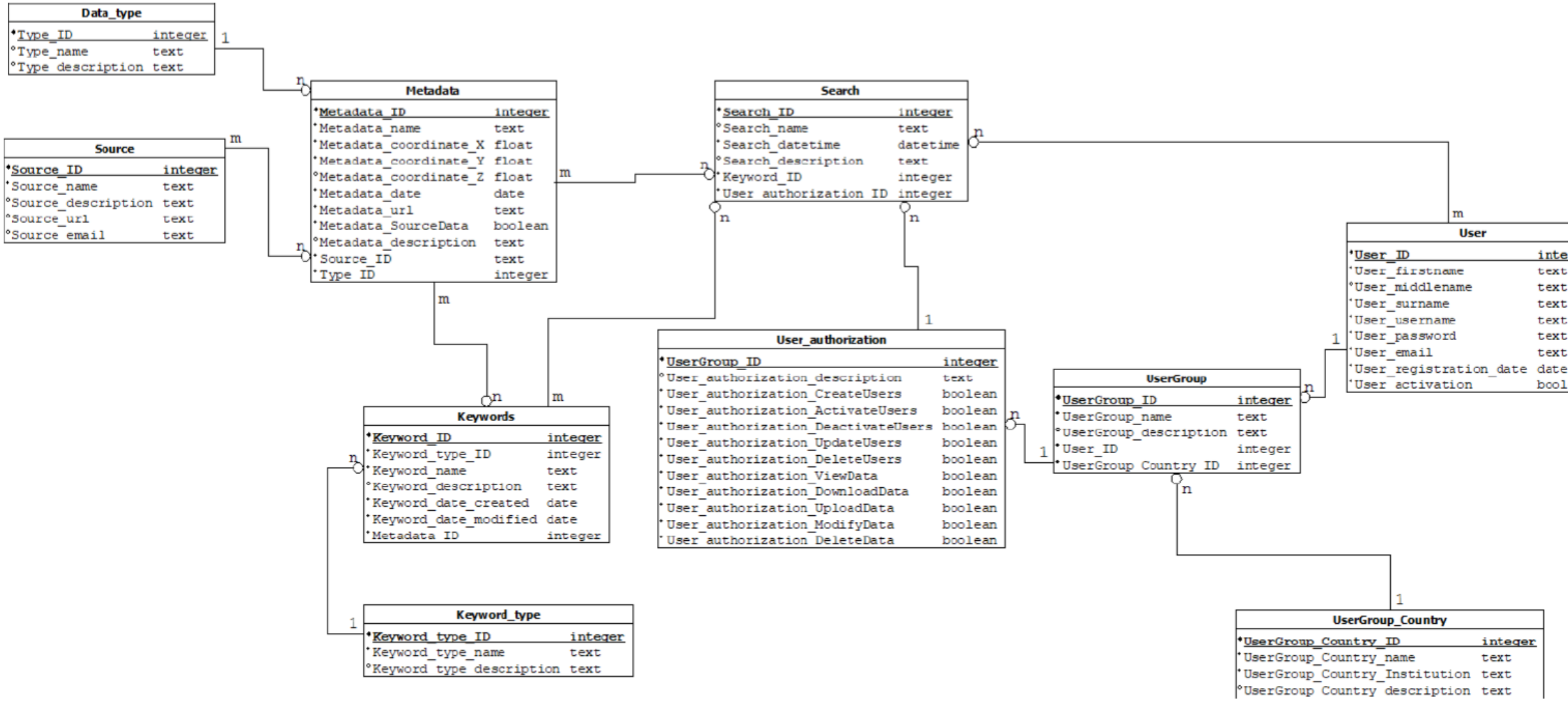
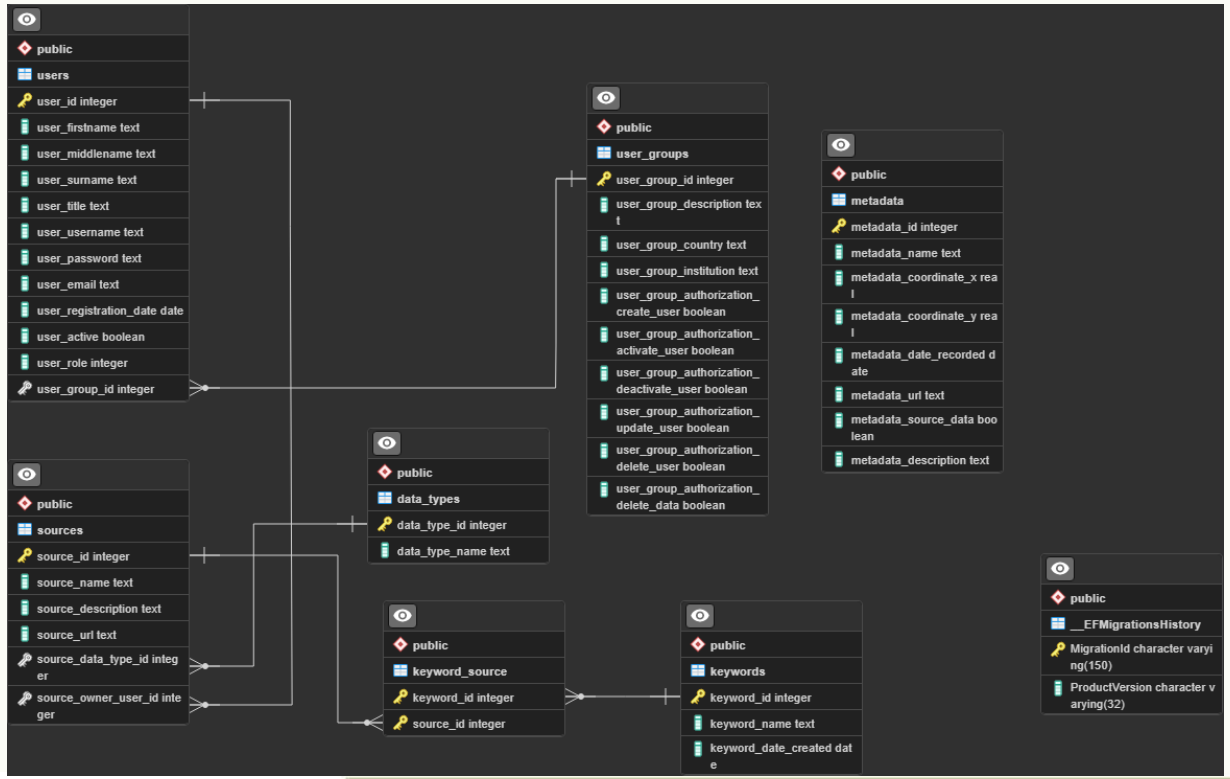
Relational scheme



Technology - Database ✓

- PostgreSQL 15
- PostGIS
- Pgadmin 4



- Advantage: SQL queries of GIS data

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Dynamic Database Changes ✓

- ORM methodology
- Entity Framework Core 7.0

- Easy to modify database for the new requirements
- Code first method create the object side and migrates the changes

```
namespace RuralGIS.Data
{
    [Table("data_types")]
    public class DataType
    {
        // Primary data, Method, Result

        /// <summary>
        /// Unique identifier for data type, primary key.
        /// </summary>
        [Key]
        [Column("data_type_id")]
        [Comment("Unique identifier for data type, primary key.")]
        public int Id { get; set; }
        /// <summary>
        /// Name of the data type.
        /// </summary>
        [Column("data_type_name")]
        [Comment("Name of the data type.")]
        public string Name { get; set; }
    }
}
```

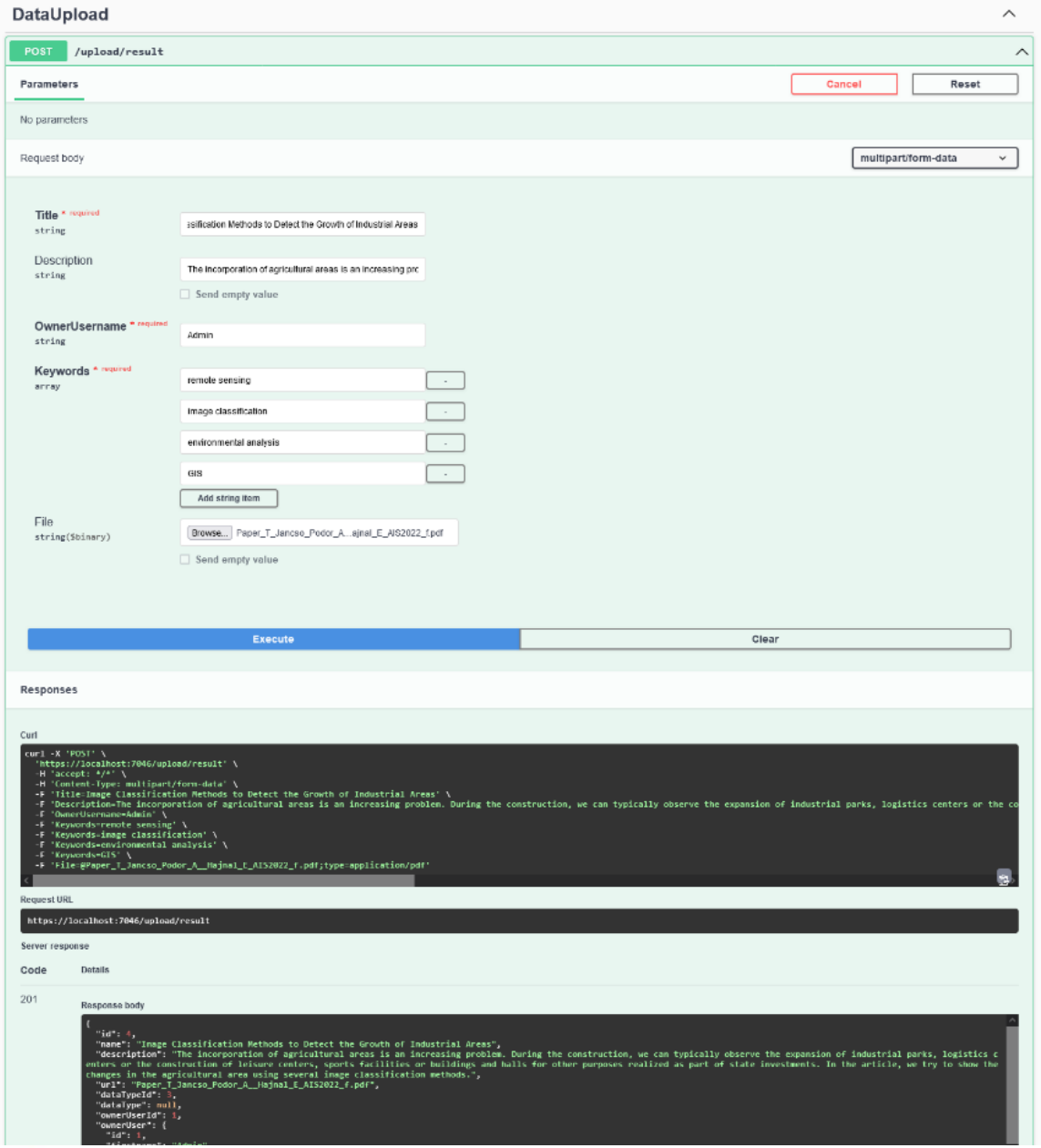
Asp.net Core WEBAPI Technology ✓

- LINQ queries – high abstraction level database technology
- JSON communication
- Data annotations for safety
- Authorization

```
var builder = WebApplication.CreateBuilder(args);

// Add services to the container.
builder.Services.AddDbContext<DataContext>(
    o => o.UseNpgsql(builder.Configuration.GetConnectionString("Database")));

// JWT authentication
builder.Services.AddAuthentication(JwtBearerDefaults.AuthenticationScheme)
    .AddJwtBearer(options =>
    {
        options.TokenValidationParameters = new TokenValidationParameters
        {
            ValidateIssuer = true,
            ValidateAudience = true,
            ValidateLifetime = true,
            ValidateIssuerSigningKey = true,
            ValidIssuer = builder.Configuration["Jwt:Issuer"],
            ValidAudience = builder.Configuration["Jwt:Audience"],
            IssuerSigningKey = new SymmetricSecurityKey(Encoding.UTF8.GetBytes(builder.Configuration["Jwt:Key"]))
        };

        options.Events = new JwtBearerEvents()
        {
            OnMessageReceived = context =>
            {
                var accessCookie = context.Request.Cookies["JWT"];

                // Authorization fails if client doesn't have the cookie
                if (accessCookie == null)
                    context.Fail("Unauthorized");

                // Authorization fails if user doesn't exist
                WebHost.CreateDefaultBuilder(args)
                    .UseStartup<DelegateStartup>()
                    .UseKestrel(opt => {
                        var sp = opt.ApplicationServices;
                        using (var scope = sp.CreateScope())
                        {
                            var db = scope.ServiceProvider.GetService<DataContext>();
                            var identity = context.HttpContext.User.Identity as ClaimsIdentity;

                            if (identity == null)
                                context.Fail("Unauthorized");

                            var idClaim = identity.Claims.FirstOrDefault(claim => claim.Type == ClaimTypes.SerialNumber)?.Value;

                            if (idClaim == null)
                                context.Fail("Unauthorized");
```

RuralGIS – Testing ✓

- Backend is ready
- Testing is independently from frontend with Swagger technology
- Execution in Docker container



RuralGIS Frontend ⏳

- Style
- Technology
  - React JS frontend

THANK YOU FOR YOUR ATTENTION!

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