**COS 214 PRAC 6**



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**Functional requirements:**

1. **Buildings:**
   * Build a building
     + Residential
     + Commercial
     + Industrial
     + Landmarks
   * Every building has different attributes and performance.
     + Expansion of buildings.
     + Destruction of buildings.
   * Calculate citizen’s satisfaction with the building.
   * Building has impact on economy and economic growth.
     + Rent
     + Monthly installments
     + Already bought
   * Ability to calculate the resource consumption of buildings.
     + This means that buildings get provided utilities and resources.
2. **Utilities:**
   * Build a utility.
     + Power plants
     + Water supply
     + Waste management
     + Sewage systems
   * Utilities are provided to buildings.
   * Citizens can interact with different utilities.
   * Utilities can affect buildings and citizens.
     + Citizens and buildings can rate their satisfaction with the utilities.
   * Connection to resources – resources are allocated to utilities.
3. **Transportation:**
   * Different types of transport
     + Public
     + Trains
     + Airports
   * For each type of transport, we have the seating capacity.
   * Roads, railways and runways
     + Evaluate traffic flow.
     + Different commute times.
     + Connect the city.
     + Citizens can rate their satisfaction with the transport systems.
     + Impact on the economy.
     + Maintenance on the structures.
4. **Citizens**
   * Citizens can demand housing, employment and services.
     + Not all citizens will be granted access to all the above.
     + Employment is affected by the availability of industrial and commercial buildings.
     + Services are available according to your employment and “class” in the economy.
   * Create and destroy citizens. (For legal reasons, we are not murdering them 😉)
   * Citizen satisfaction will be influenced by different factors.
     + Taxes
     + Resources
     + Home life (buildings and employment)
   * Citizens should respond to:
     + Government policies (law).
     + Economic changes (new buildings, jobs and different tax rates).
     + Infrastructural development (new buildings and utilities).
5. **Government**
   * Oversee taxes
     + Collection
     + Allocation
     + Tax rates
   * Oversee the city budget
     + Allocating budget to improve landmarks, education, buildings, security, services and utilities.
     + City projects – like a cancer awareness campaign.
   * Oversee policies
     + The laws and regulations of the city.
       - Examples are, having industrial zone away from the residential areas and having laws on what would happen if you don’t pay taxes.
   * Oversees public services.
   * Government will have an impact on citizen satisfaction.
   * Impact economic growth and city development (mentioned before).
6. **Resources**
   * Different types of resources
     + Materials
     + Energy
     + Water
     + Budget (control handed over to government).
   * Resources will be supplied to utilities and buildings.
   * Enable city expansion on the availability of resources.
7. **Taxes**
   * Control of taxes is handled by the government.
   * Includes tax rates, collection of taxes, allocation of taxes and the impact taxes have.
   * Citizen satisfaction is influenced as well as the economy.
8. **City growth**
   * Influenced by:
     + Population growth
       - Birth rates and economic opportunities.
     + Housing needs
       - Driven by population growth.
       - Expansion of buildings.
     + Economic development
       - Expansion of commercial and industrial areas and buildings, which will provide more jobs.
     + Infrastructure development
       - Based on population growth and economic development.
       - Added as needed for expansion of the city (influenced by above factors).

**Design patterns:**

1. Façade
   * Overview of whole system, especially city growth.
2. Singleton
   * Resources and resource management.
3. Mediator
   * Communication between city and government.
4. Factory method
   * Buildings and utilities and transportation infrastructure.
5. Observer
   * Population growth
6. Prototype
   * Citizen creation
7. Command
   * Taxes
8. Chain of responsibility
   * City growth
9. Strategy
   * Transport
10. Composite
    * Government

**References**

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Slides

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