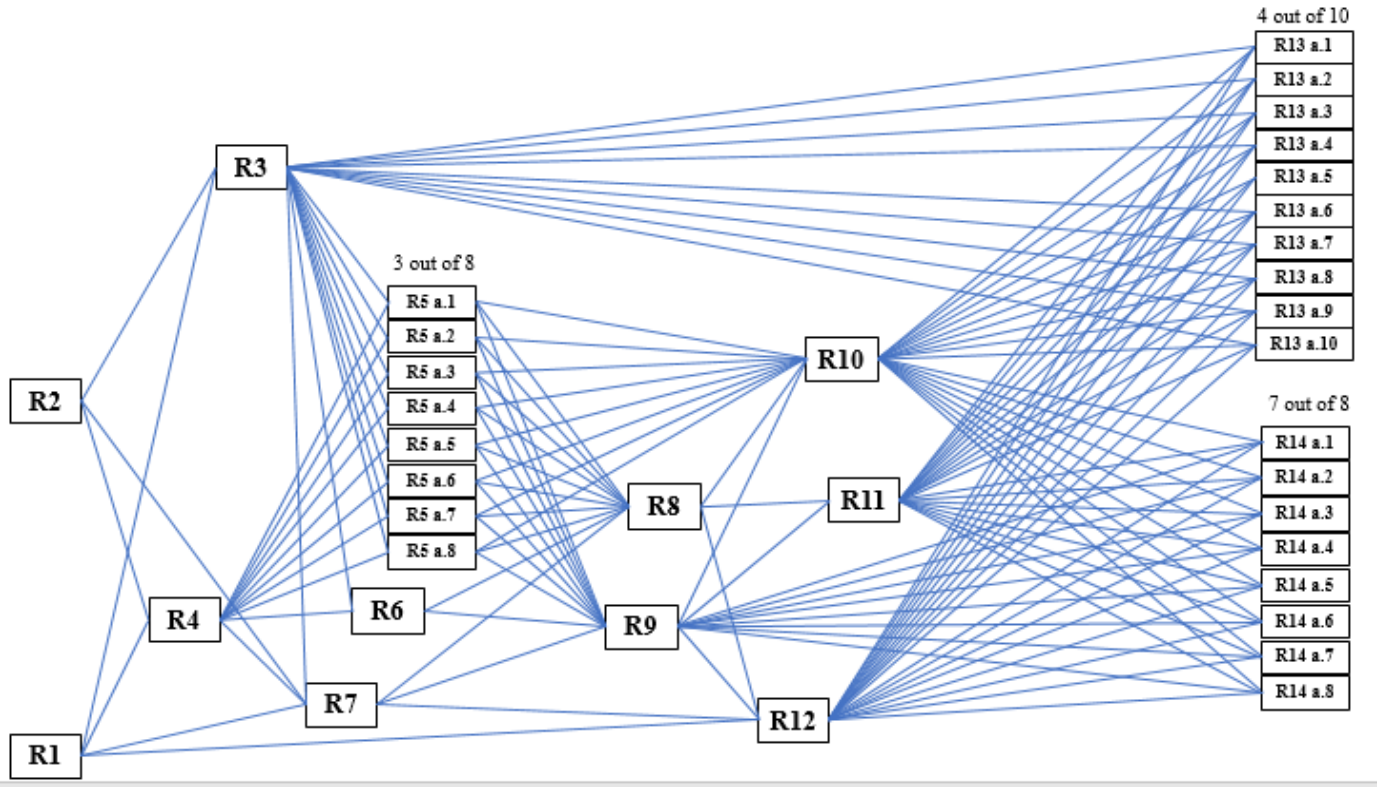
# Reliability Analysis

Implementation of a novel combinatorial algorithm in conditional and redundancy systems using advanced computational techniques

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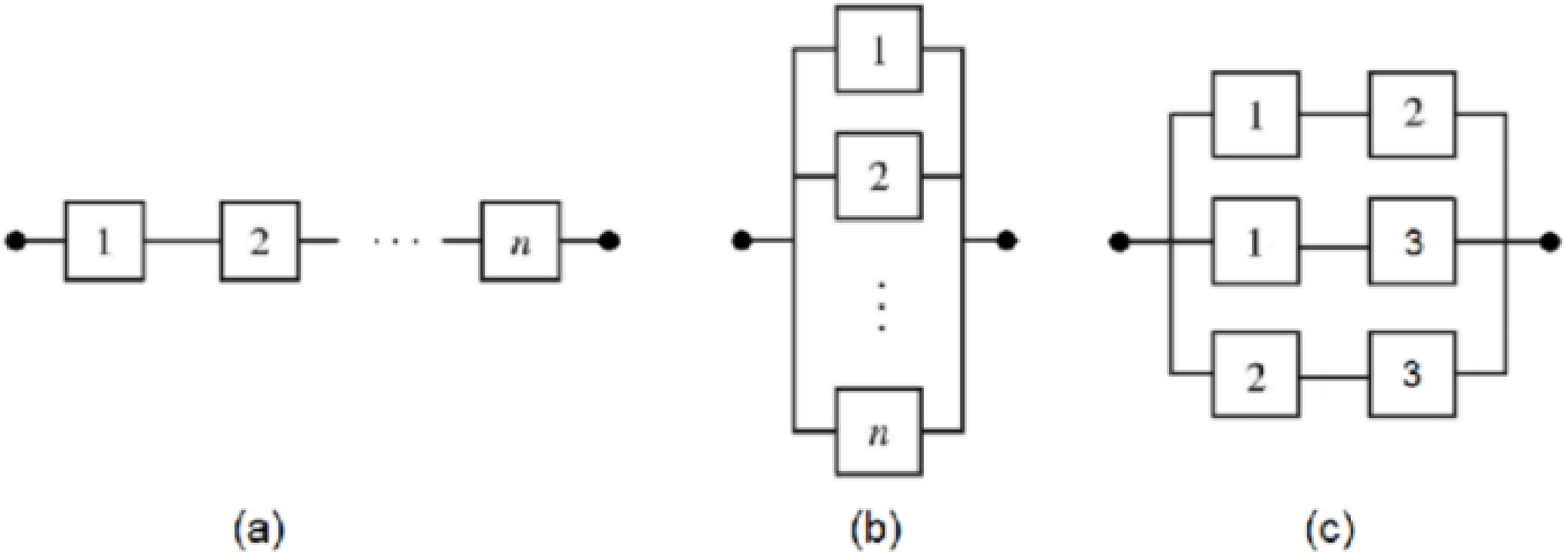
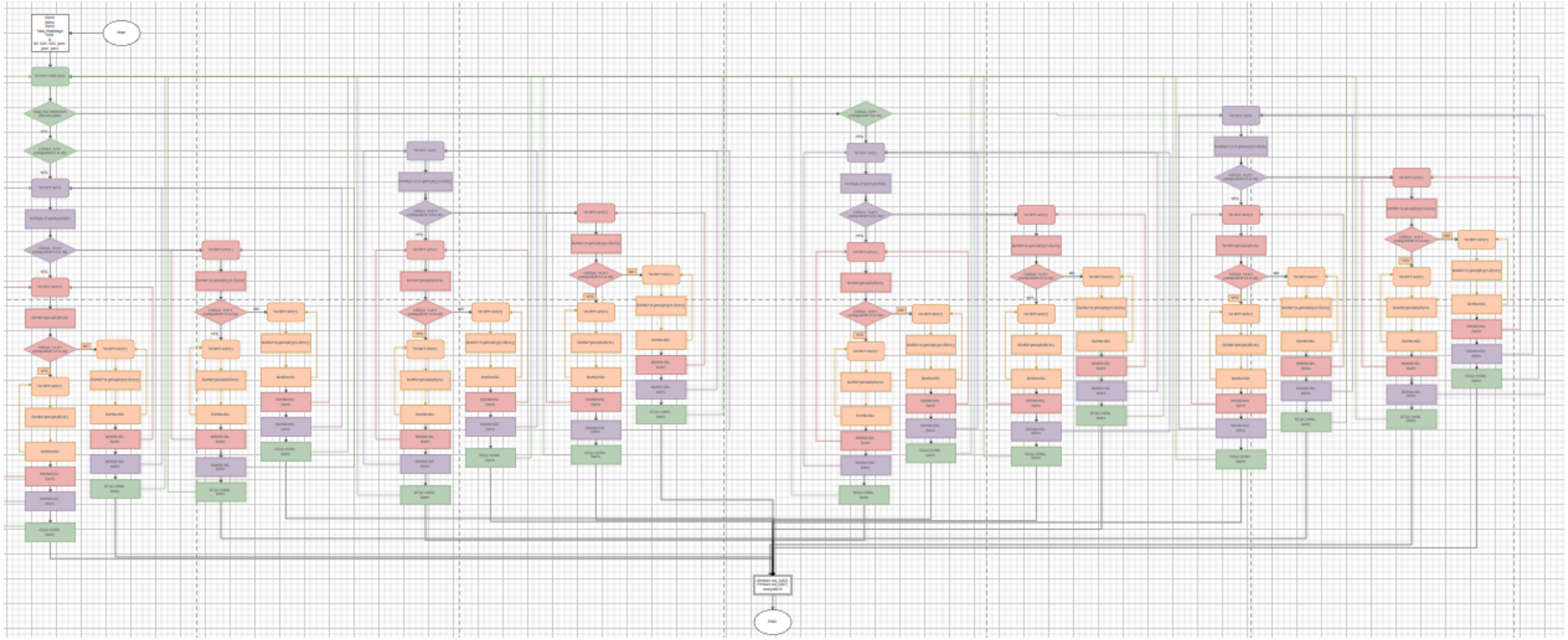
In collaboration with A.O. Olivera, Mechanical & Electrical Engineering Student at University of Puerto Rico – Mayaguez Campus

# Introduction



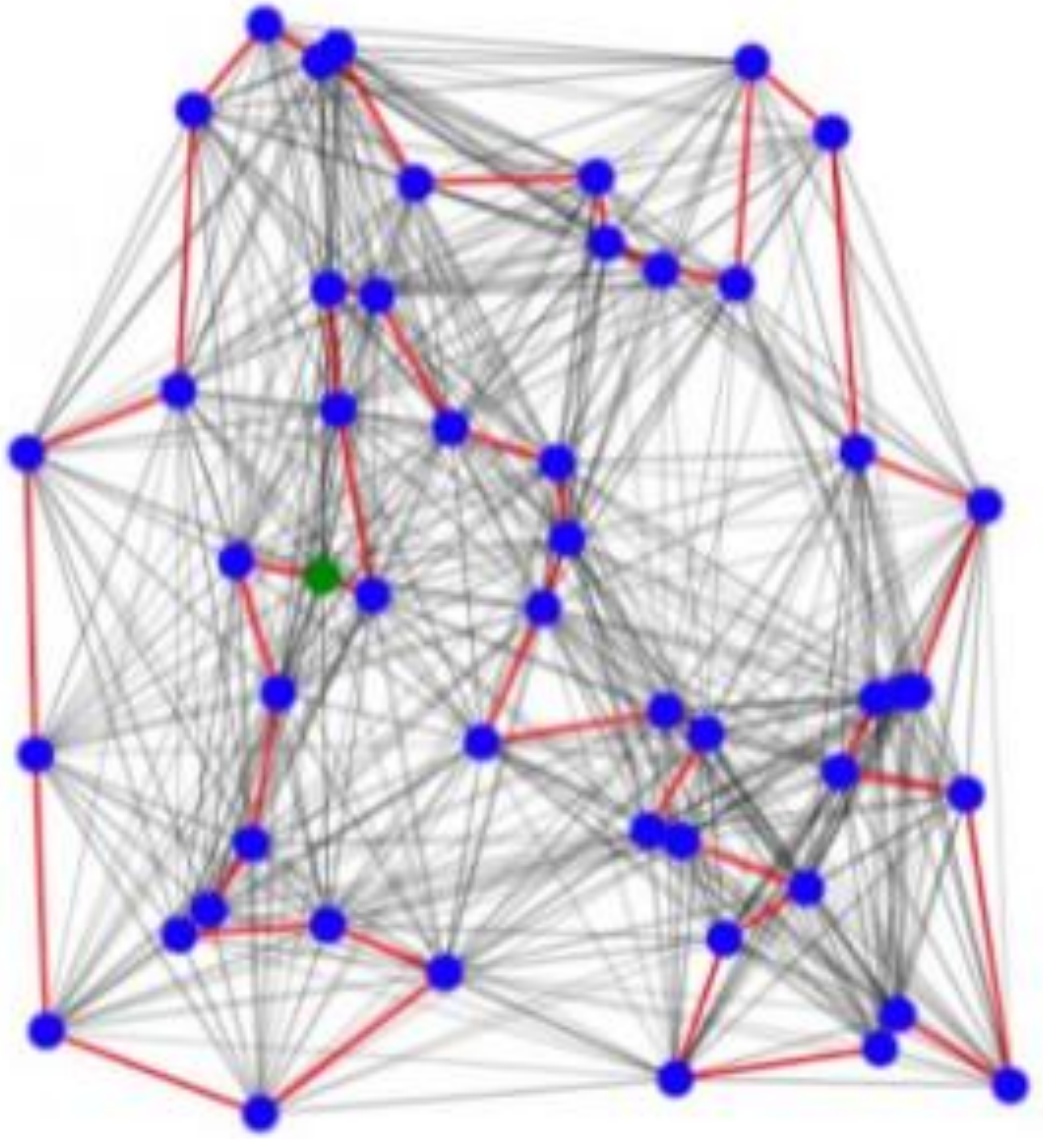
# Problem Statement

# Objective



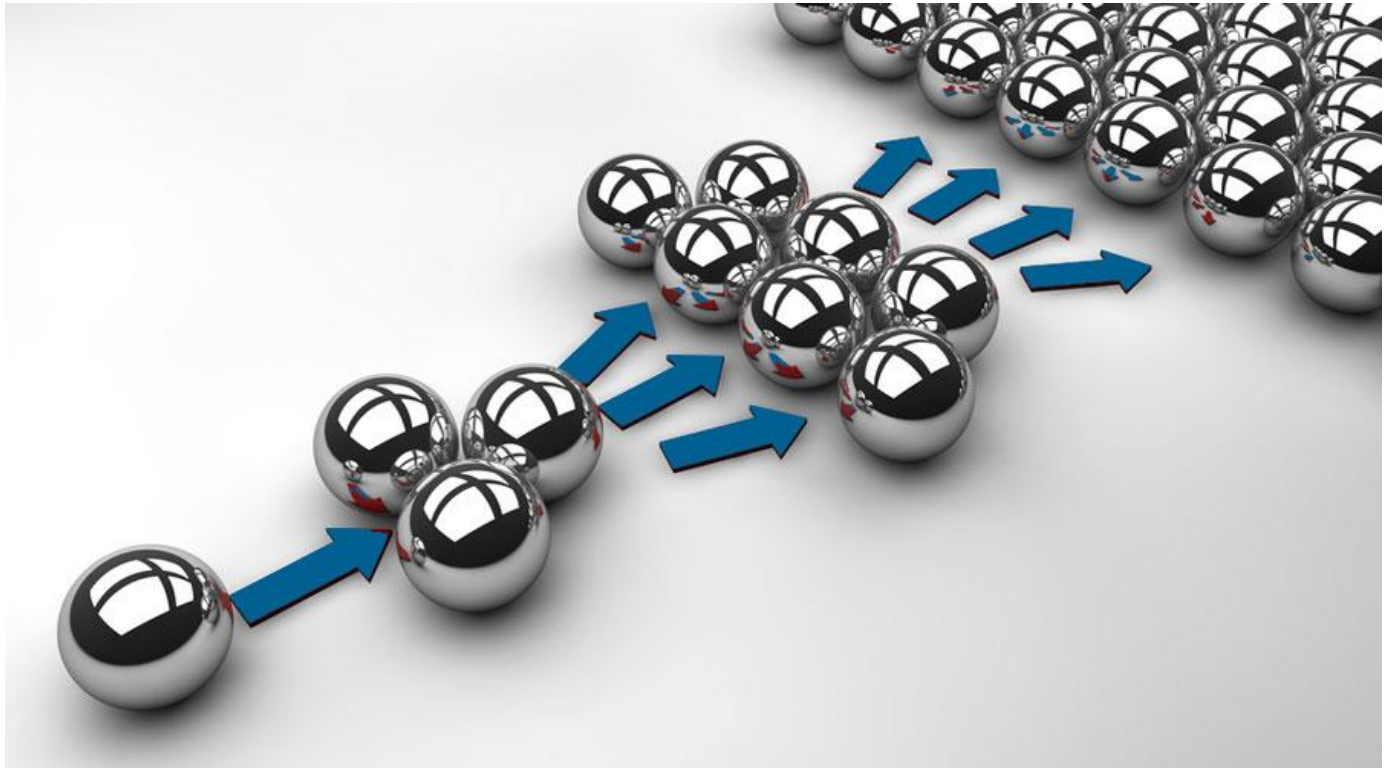
# Previous Research & Current Knowledge

1. Overview of the conditional algorithm developed by A.O. Olivera
2. Algorithm optimization and enhancement of computational resources to solved the use case, by Jesus Olivera.



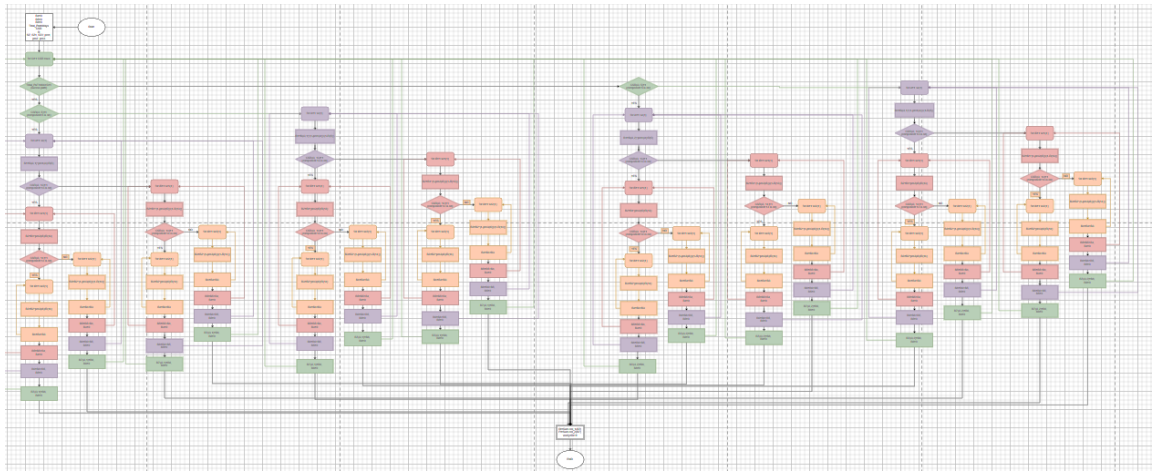
# Importance

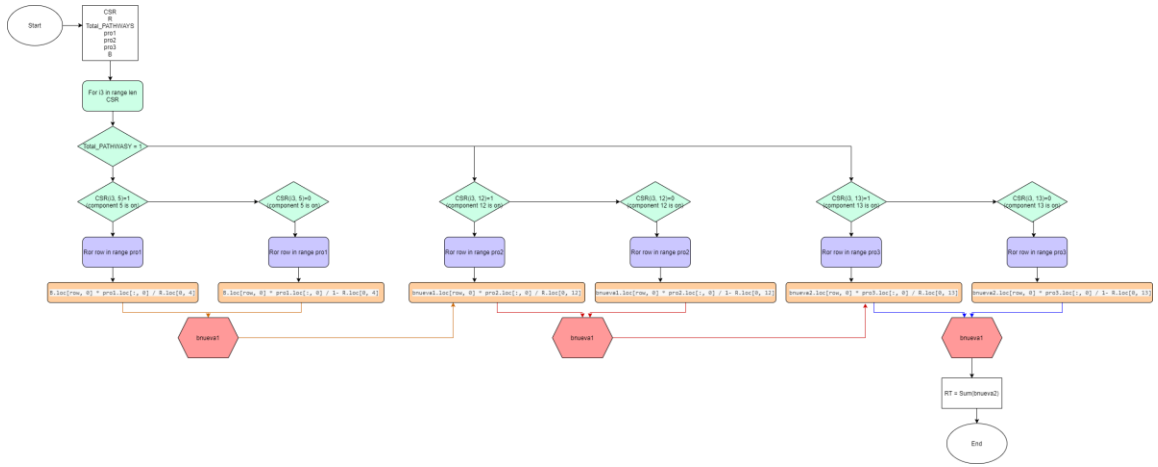
# Broader Impact



# Optimization Techniques

## Loop Optimization





# Optimization Techniques

## Data Alignment, Profiling & Parallelism

### Data Alignment

```
bnueva = bnueva.append(pd.DataFrame(a), ignore_index=True).replace(0, np.nan).dropna(how='all', axis=0)
```

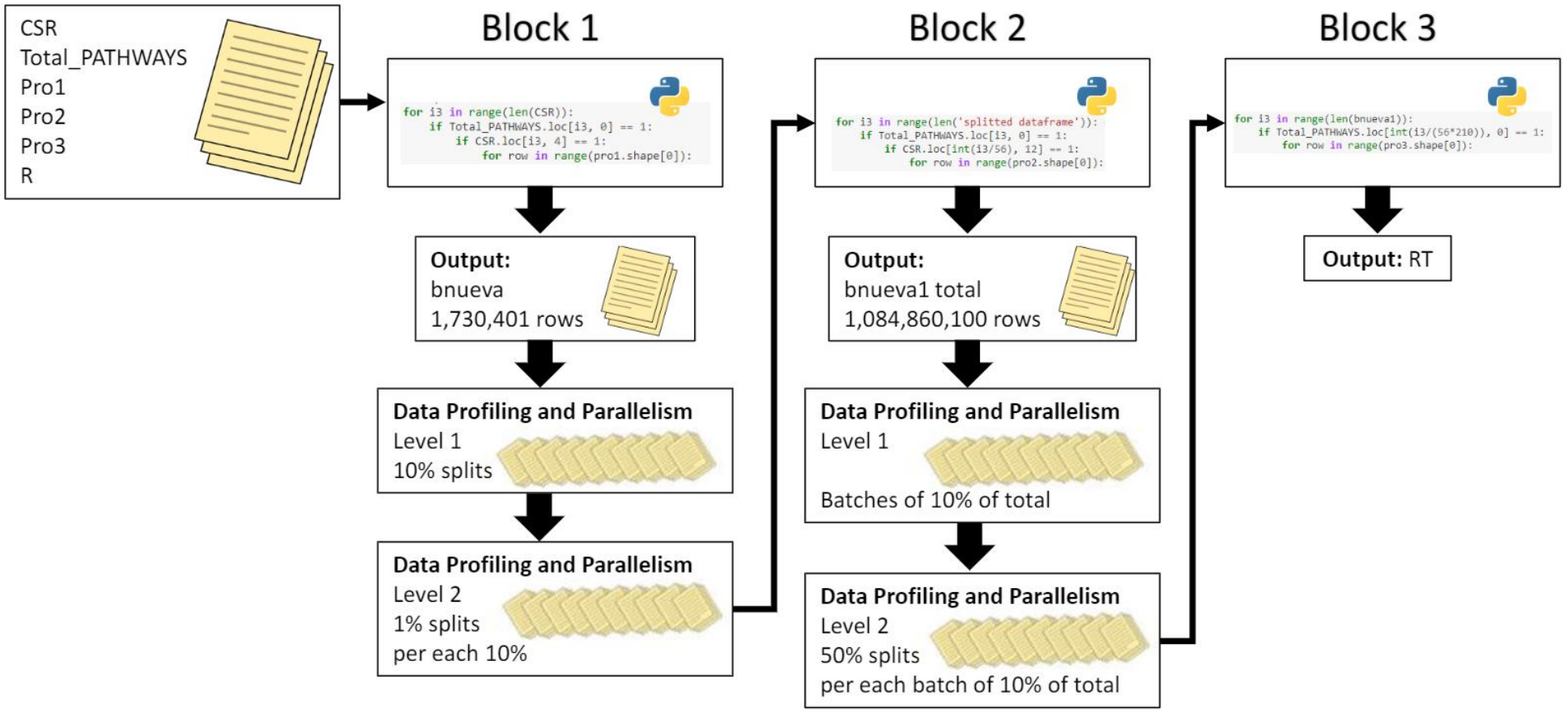
### Profiling and Parallelism

```
bnueva_A = bnueva.iloc[0:173040,:].copy().reset_index(drop=True)
```

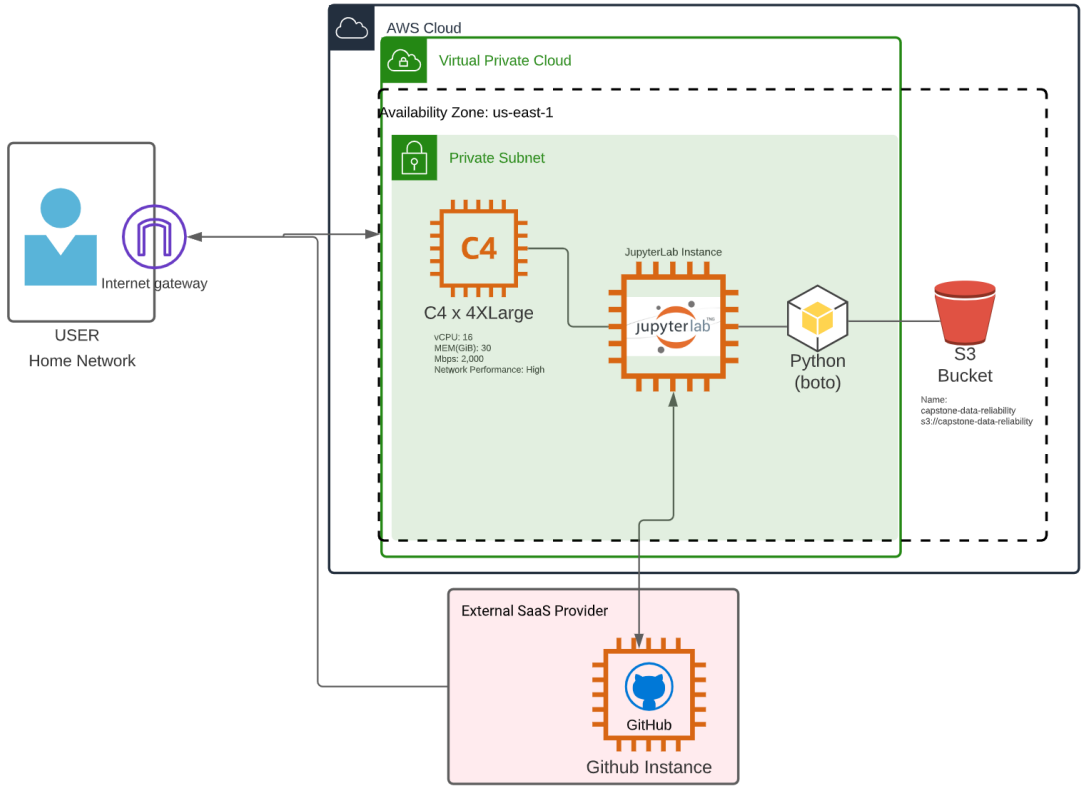
```
bnueva_A1 = bnueva.iloc[0:1000,:].copy().reset_index(drop=True)
```

```
bnueva1 = bnueva.iloc[0:5424301,:].copy().reset_index(drop=True)
bnueva2 = bnueva.iloc[5424301:10848602,:].copy().reset_index(drop=True)
```

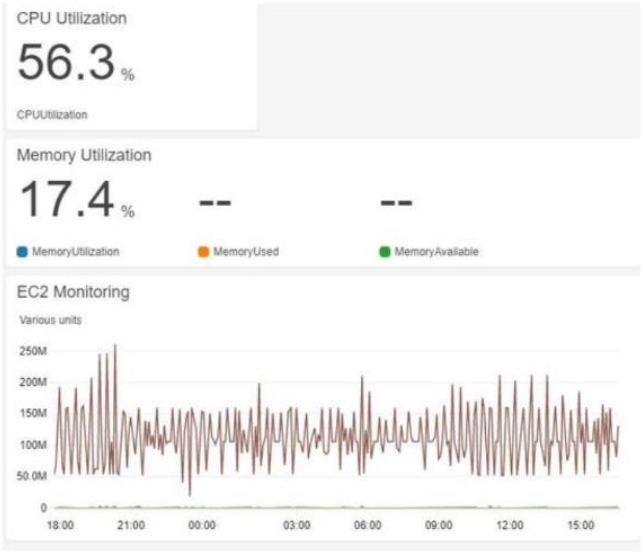
# Algorithm Data Flow Diagram



# Computational Virtual Environment




**High Peak Performance**



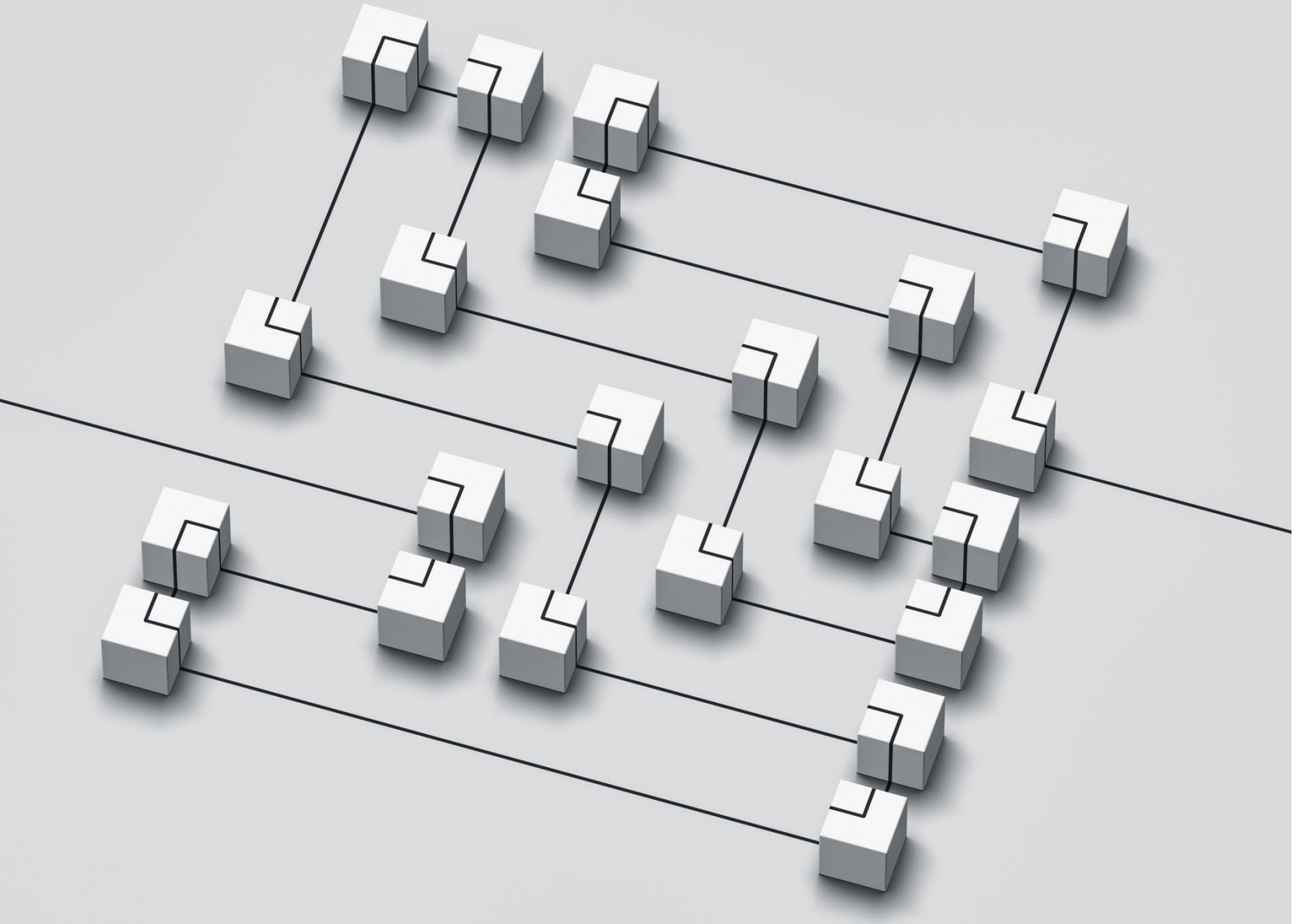

**Minimum Resources Requirements (peak)**

vCPU: 9

MEM(GiB): 5.1

NetworkOut (Bytes): 110,444,655

NetworkIn (Bytes): 5,706,704



# Future Steps

- Leverage functions and input parametrization
- Explore automation by building ETL integration
- Design a deployment space
- Built deployment space
- Expose deployment space
- Explore big data processing libraries like PySpark, Vaex, Dask, Rapids, Koalas, etc.

# Thanks !