

GENETIC ALGORITHM ASSISTED DECISION  
MAKING FOR DATA BASED RESIDENCE ROOF  
TRUSS SYSTEM

MEMBER

WUKAI KONG

Z5155304

# RESEARCH INTRODUCTION

RESEARCH INTRODUCTION

**I DON'T  
SHARE  
FOOD**



# RESEARCH AIMING

## EXISTING PROBLEMS

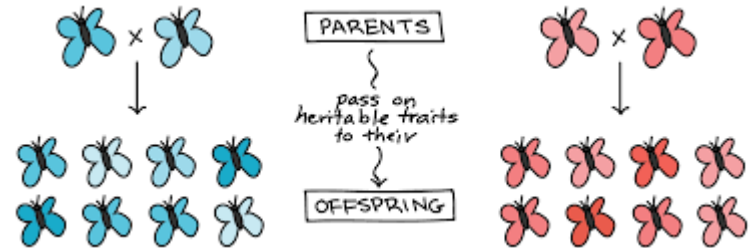
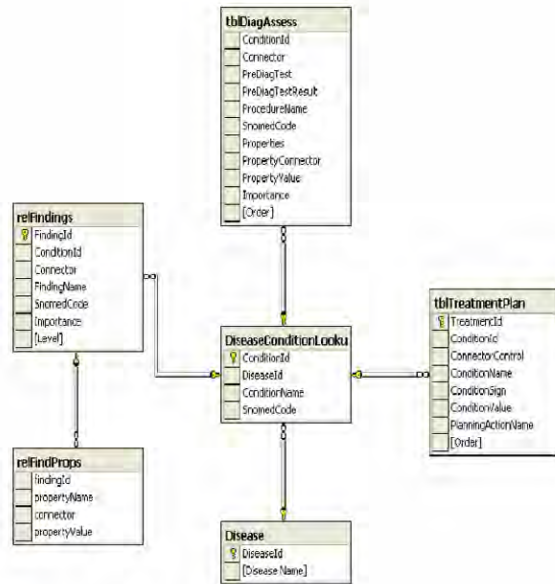
- The Not Sharing Idea Are Effecting The Architecture Industry
- Losing Of Trusted Structural Data It Is Hard To Convince That The Current Design Is Better
- Structural Diversity Is Limited Due To Design Period Requirement

## POTENTIAL SOLUTIONS

- Creation Of Database Systems Is Helping Architects To Share Their Ideas
- The Genetic Algorithm Will Provide The Best Solution From The Existing Database Generation
- Architects Has More Choice And More Time To Develop New Truss System

# RESEARCH BACKGROUND

RESEARCH BACKGROUND



# RESEARCH CIRCLE

IDEA INSPIRATIONS — BACKGROUND RESEARCH — RESULT ANALYSING



# RESEARCH METHODOLOGY

РЕСЕРЧ МЕТОДОЛОГІА



grasshopper



**SLINGSHOT!**



# PROJECT WORKFLOW

## PROPOSAL AND APPROVAL

Background Research For  
Inspiration And Compare With  
Similar Work To Come Up With  
Brief Idea

*W4*

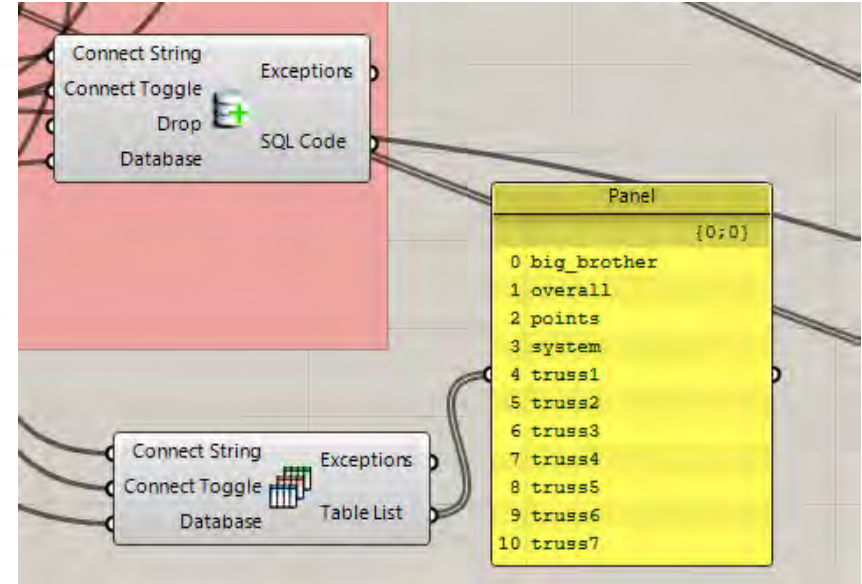
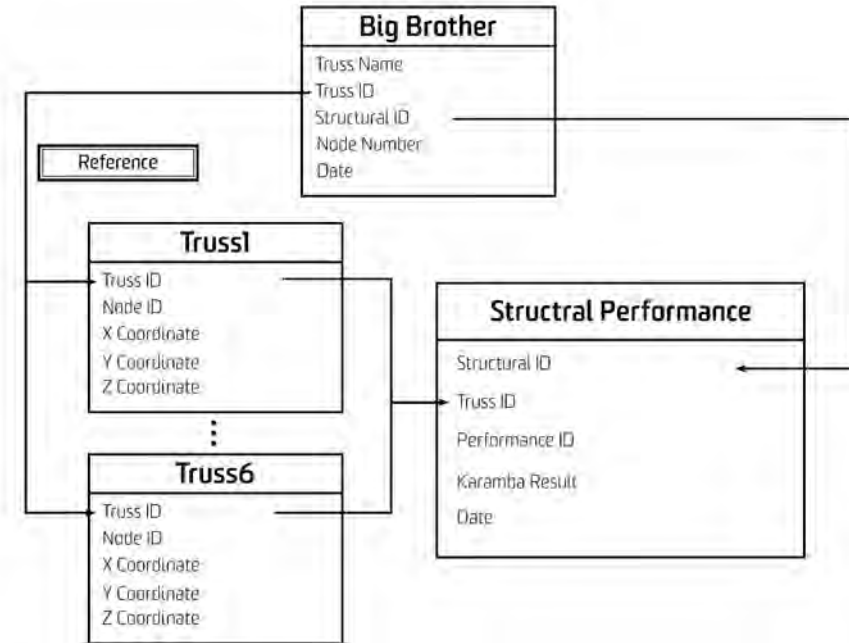
Finalising The Database  
Creation With Ideally Looking  
Up Each Elements Inside Each  
Table

*W7*

Finalising The Project With The  
Connection Between SQL Database  
And Genetic Algorithm Processing

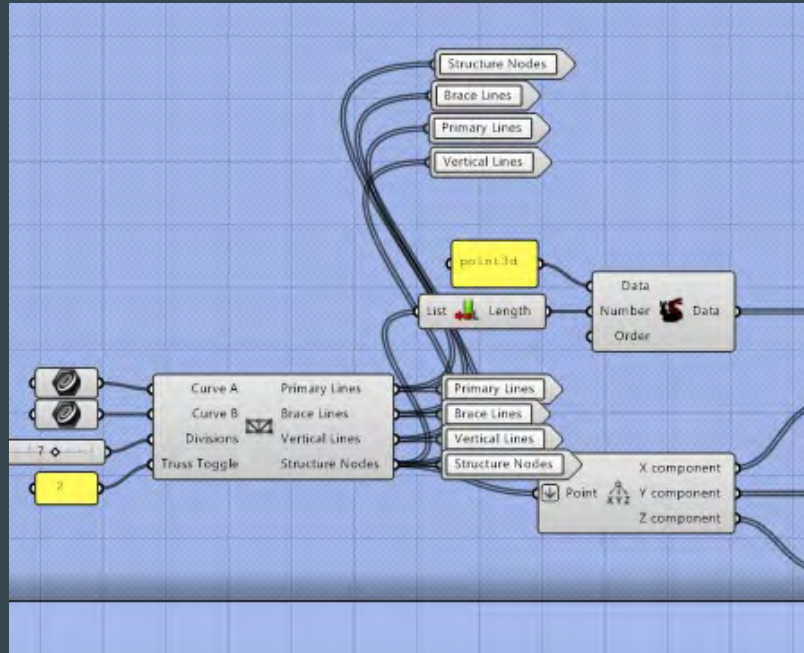
*W10*

# DATABASE CREATION

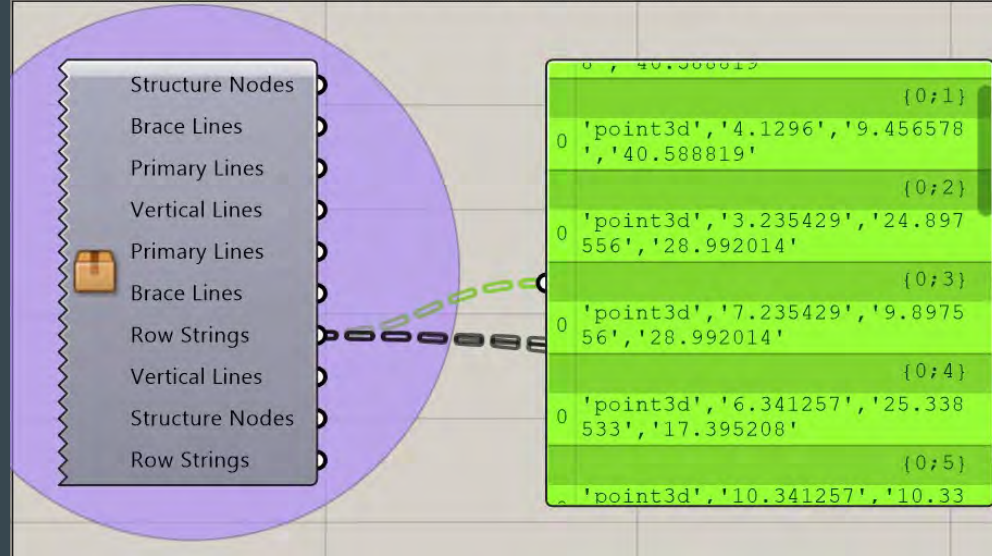




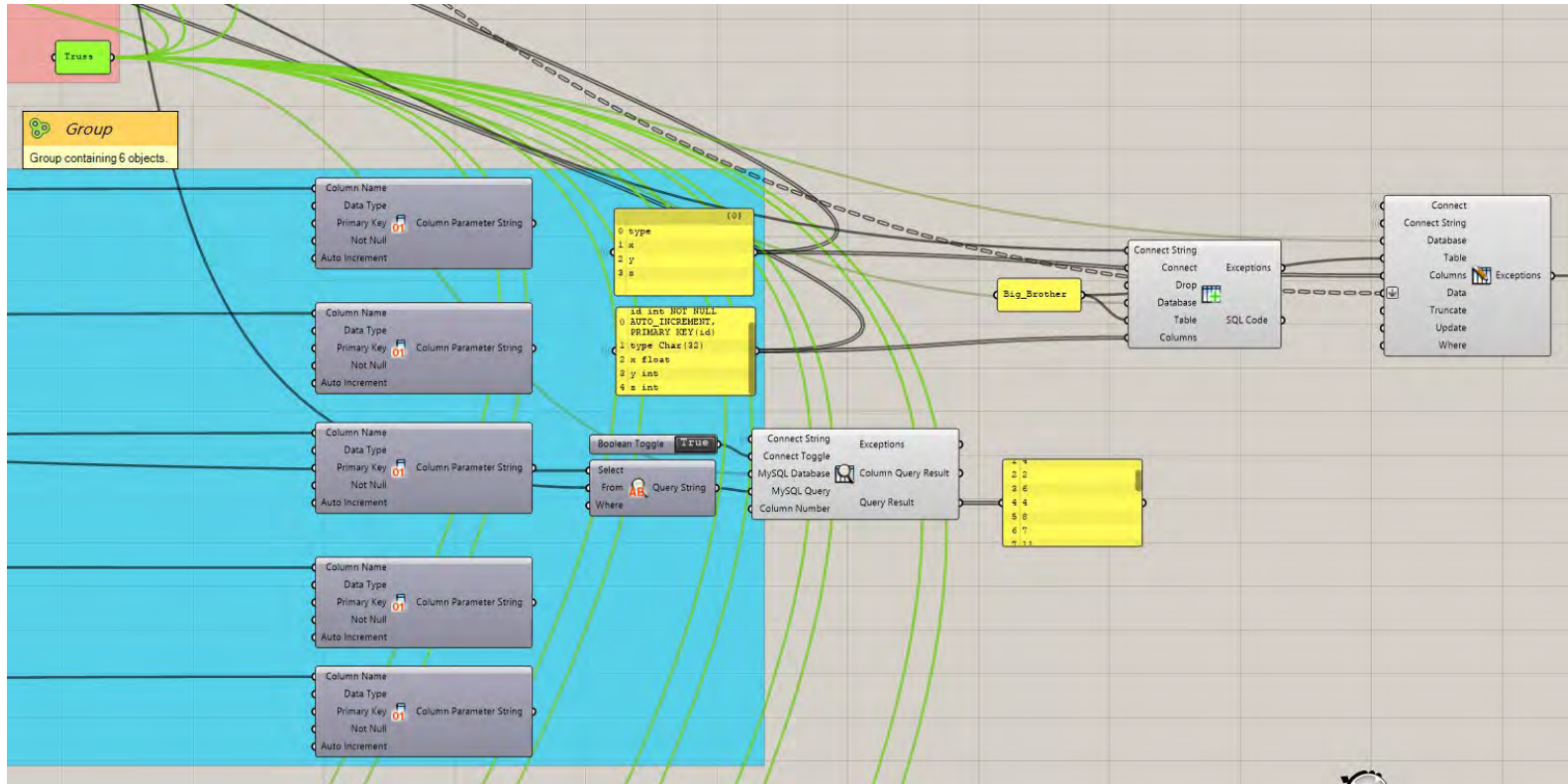
# INFORMATION STORING



## The First Truss Structure



# ELEMENT SEARCHING





# GENETIC ALGORITHM PROCESS

Galapagos Editor

Options Solvers Record

Galapagos Species Record

Created on: Tuesday, 19 November 2019 (14:54:46)

Generation 1

```
{
Bio-Diversity: 0.900
Genome [0], Fitness=-88.20, Genes [50%]
Genome [1], Fitness=-88.20, Genes [50%]
Genome [2], Fitness=-88.20, Genes [50%]
Genome [3], Fitness=-88.20, Genes [50%]
Genome [4], Fitness=-88.20, Genes [50%]
Genome [5], Fitness=-88.20, Genes [50%]
Genome [6], Fitness=-88.20, Genes [50%]
Genome [7], Fitness=-88.20, Genes [50%]
Genome [8], Fitness=-88.20, Genes [50%]
Genome [9], Fitness=-88.20, Genes [50%]
Genome [10], Fitness=-97.50, Genes [70%]
Genome [11], Fitness=-97.50, Genes [70%]
Genome [12], Fitness=-97.50, Genes [70%]
Genome [13], Fitness=-97.50, Genes [70%]
Genome [14], Fitness=-97.50, Genes [70%]
Genome [15], Fitness=-97.50, Genes [70%]
Genome [16], Fitness=-97.50, Genes [70%]
Genome [17], Fitness=-97.50, Genes [70%]
Genome [18], Fitness=-97.50, Genes [70%]
Genome [19], Fitness=-97.50, Genes [70%]
Genome [20], Fitness=-97.50, Genes [70%]
Genome [21], Fitness=-97.50, Genes [70%]
Genome [22], Fitness=-97.50, Genes [70%]
Genome [23], Fitness=-97.50, Genes [70%]
Genome [24], Fitness=-97.70, Genes [30%]
Genome [25], Fitness=-97.70, Genes [30%]
Genome [26], Fitness=-97.70, Genes [30%]
Genome [27], Fitness=-97.70, Genes [30%]
```

OK Cancel

Galapagos Editor

Options Solvers Record

Start Solver Stop Solver



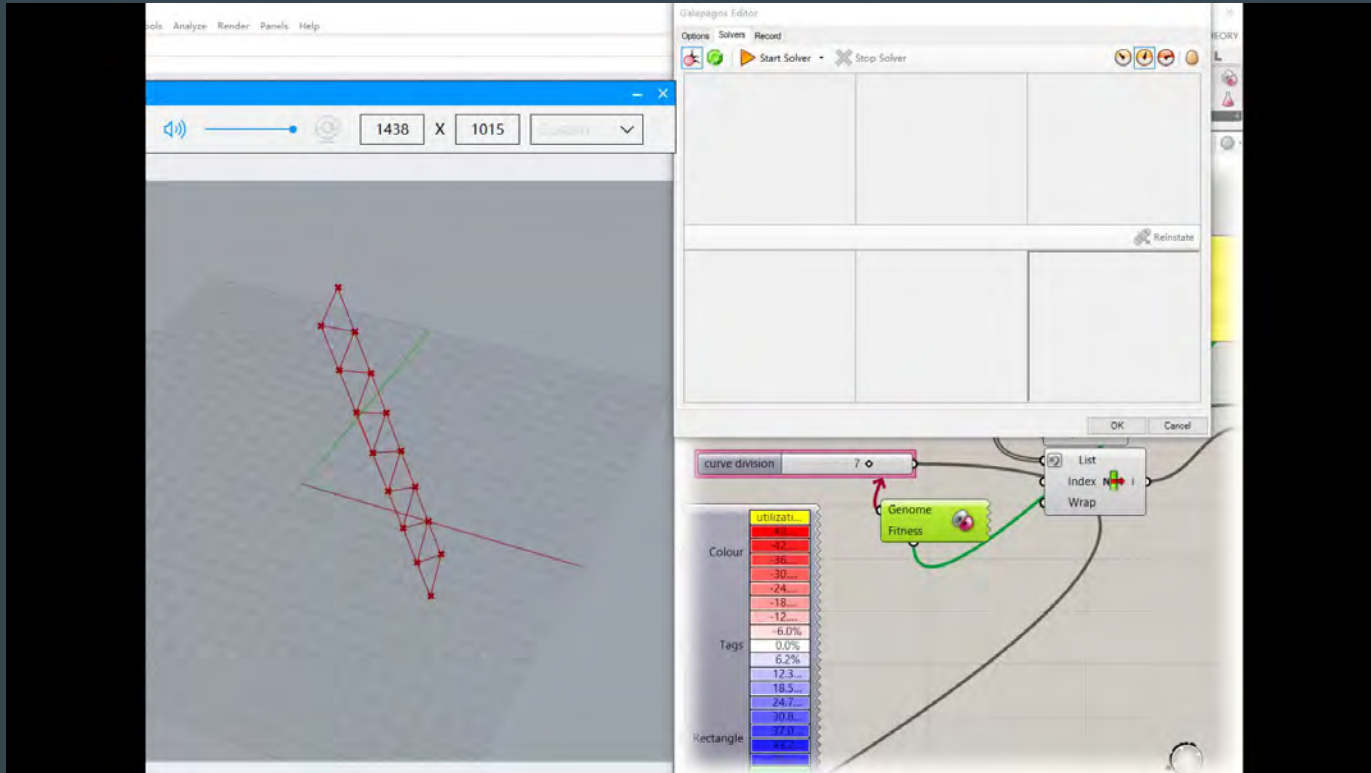
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

Display  

	-71.3	
	-71.3	
	-71.3	
	-83.2	
	-83.2	
	-97.5	
	-97.5	
	-97.5	
	-97.5	

OK Cancel

# RESULT VISUALISATION



# RESULT CONCLUSION

1/52051 001405021014

- ❑ No Connection Is Build By Slingshot And Galapagos Due To Cross Plugin Limitation
- ❑ The Genetic Algorithm Is Unable To Use The Information From The Database
- ❑ Lack Of Method To Easily Store Information In The Database
- ❑ It Shows The Potential That Genetic Algorithm Brings More Structural Diversity
- ❑ The Setting In The Genetic Algorithm Will Assist To Create Better Structure

# EVALUATION

- Better Usage Of Sharing Building Information In Design
- The Result Show How Does Algorithm Assisted Method Could Be Use
- The Generation Seems Simple In This Stage
- Both Database And Algorithm System Need To Further Develop

# FURTHER RESEARCHING

- ❑ Using python to create both database and genetic function
- ❑ More identical information stored in the database
- ❑ Easier method to input structural data into the database
- ❑ Better algorithm than genetic algorithm or better approach