

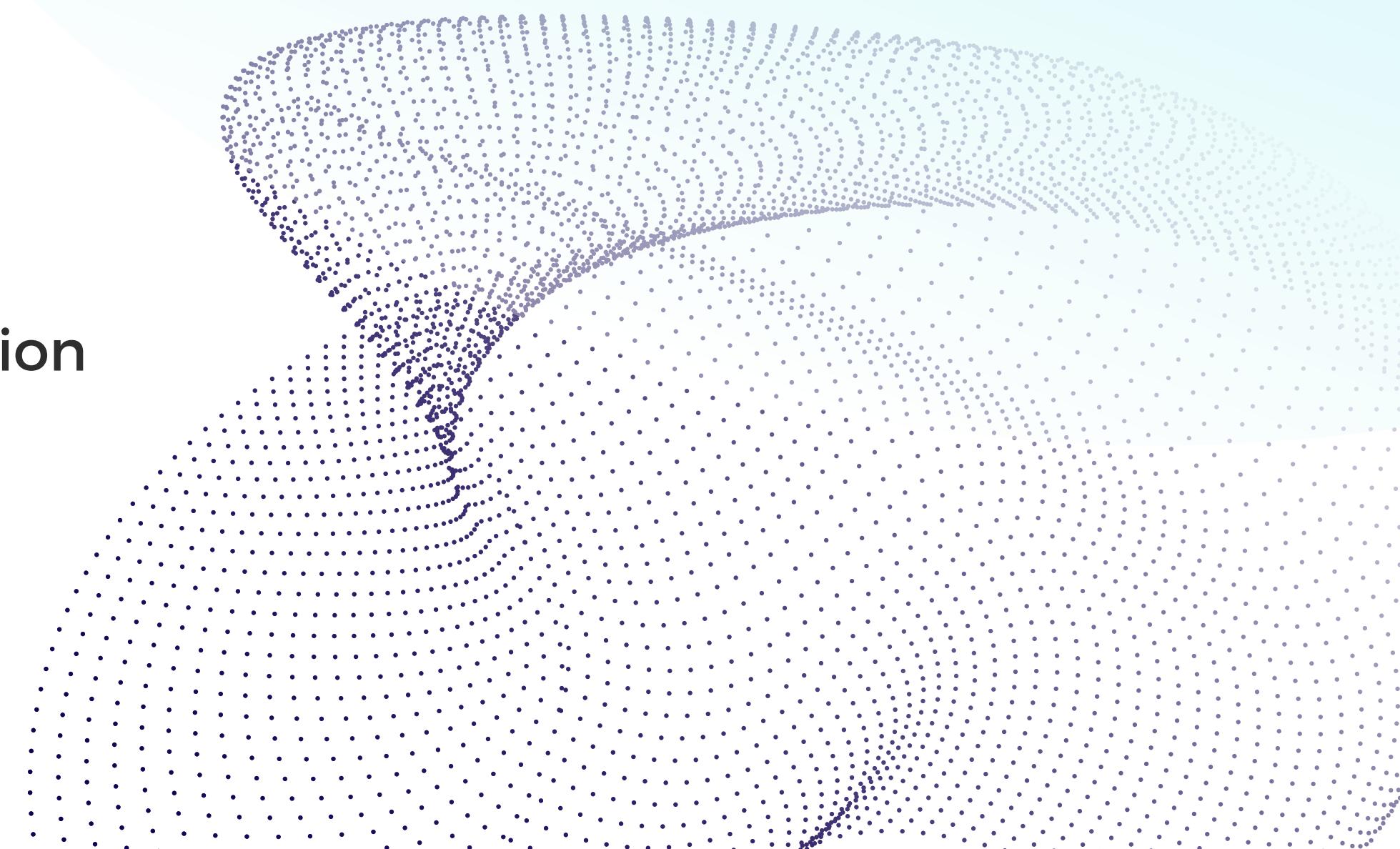
CREDIT MANAGEMENT SYSTEM



MANUK MOVSESYAN
PERJ HARUTYUNYAN
SONA MATSHKALYAN

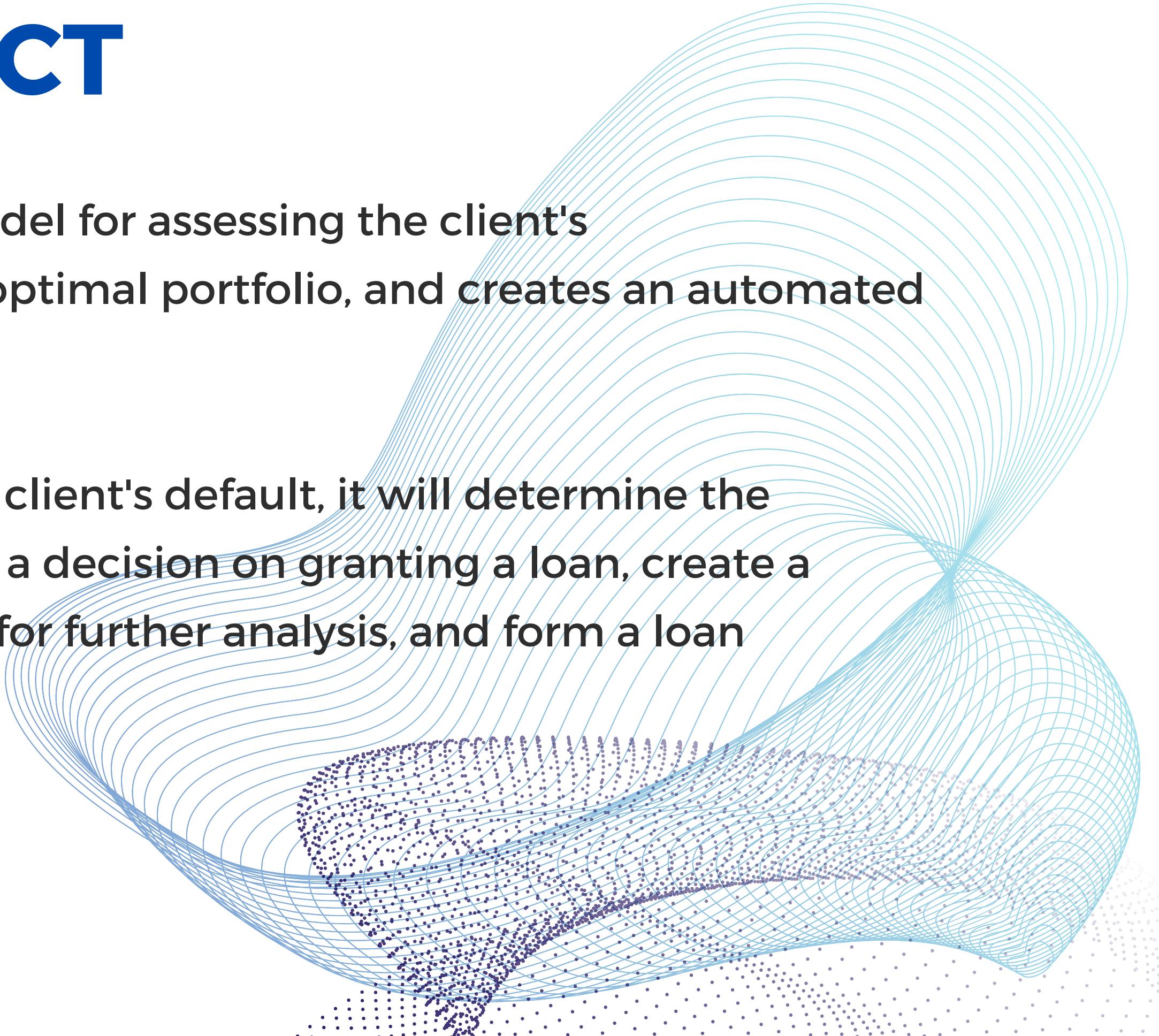
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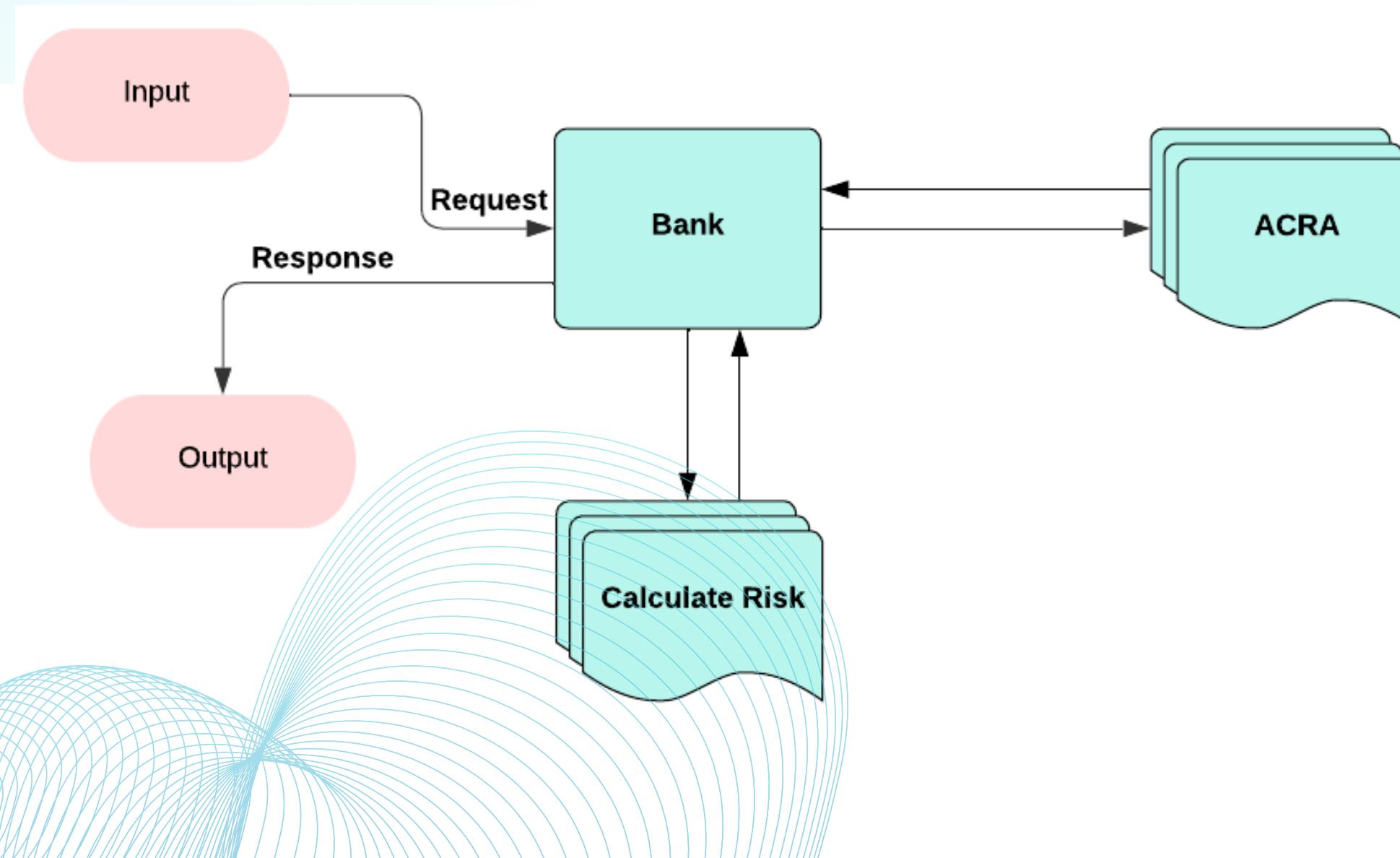
ABOUT PROJECT

- It develops a mathematical model for assessing the client's creditworthiness, develops an optimal portfolio, and creates an automated system.
- Based on the probability of the client's default, it will determine the client's creditworthiness, make a decision on granting a loan, create a database for the bank's clients for further analysis, and form a loan portfolio.



THE HIERARCHY

The entire project consists of 2 independent projects and is structured as a Microservices.



1

ACRA project

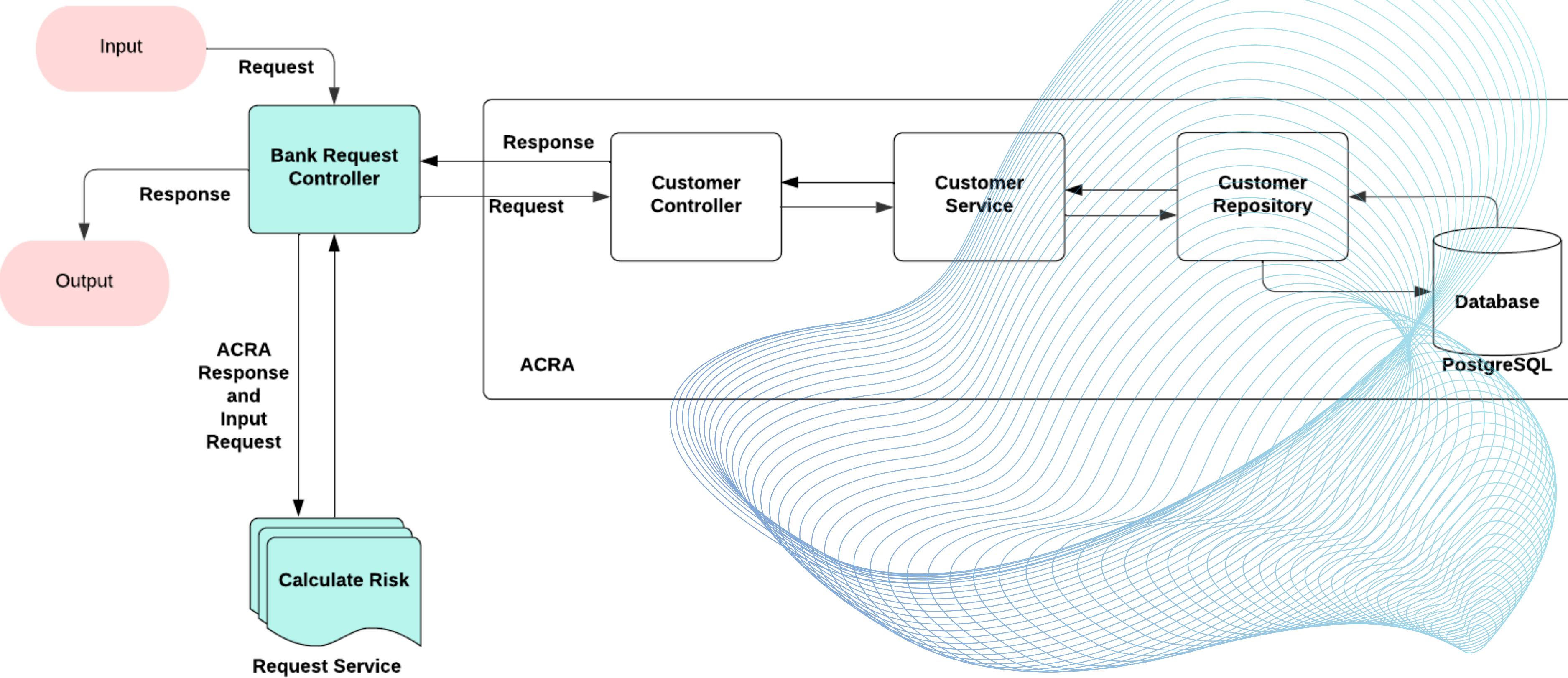
It is an base project, that maintains credit histories of customers

2

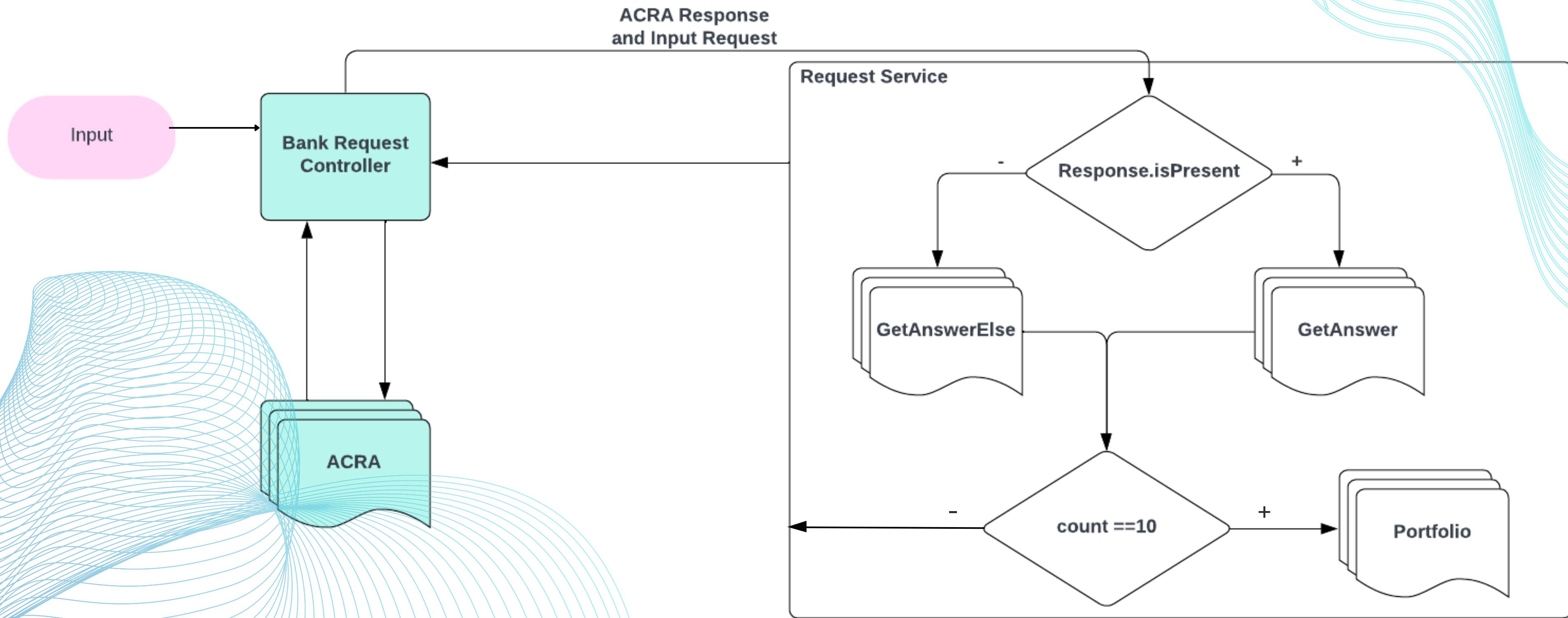
Bank project

It sends requests to ACRA project, receives the necessary information, processes it, and determines whether to approve or reject the credit application

ACRA PROJECT



REQUEST SERVICE



ASSESSING CREDITWORTHINESS

- Allows to assess the creditworthiness of the client and make a decision on granting a loan.
- Creditworthiness assessment is the probability of customer's default.

ASSESSING CREDITWORTHINESS

$$y_i = \beta_0 + \sum_{j=1}^6 \beta_j * x_{ij} \quad (1)$$

$$PD_i = 1 - \frac{1}{1 + e^{-y}} \quad (2)$$

- Selection of significant input variables.
- Creditworthiness assessment: determining the probability of default'

REGRESSION MODEL

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.57521438480375
R Square	0.330871588485156
Adjusted R Sq	0.330114941204891
Standard Erro	0.269633589934151
Observations	5313

	df	SS	MS
Regression	6	190.750304312858	31.7917173854763
Residual	5306	385.758259587047	0.0727022728207779
Total	5312	576.508563899905	

	Coefficients	Standard Error	t Stat
Intercept	0.333811373850653	0.0201653403533492	16.5537188066955
X Variable 1	0.00624585073685336	0.00261392171895896	2.38945592423513
X Variable 2	0.073415350552171	0.00438953572140386	16.7250832916542
X Variable 3	0.000116718158751398	0.00216659496325851	0.0538717022474086
X Variable 4	0.0707717296999949	0.00422136304354529	16.7651369877341
X Variable 5	-0.0779933503359887	0.00230038559847763	-33.90446818464
X Variable 6	0.101723516747402	0.00279812463818414	36.3541764220398

MATHEMATICAL MODEL OF LOAN PORTFOLIO OPTIMIZATION

$$L = \sum_{i=1}^N \sigma_i^2 * n_i^2 * w_i^2 \rightarrow \min_n \quad (1)$$

Objective function of risk minimization

$$\sum_{i=1}^N r_i * n_i * w_i \geq R \quad (2)$$

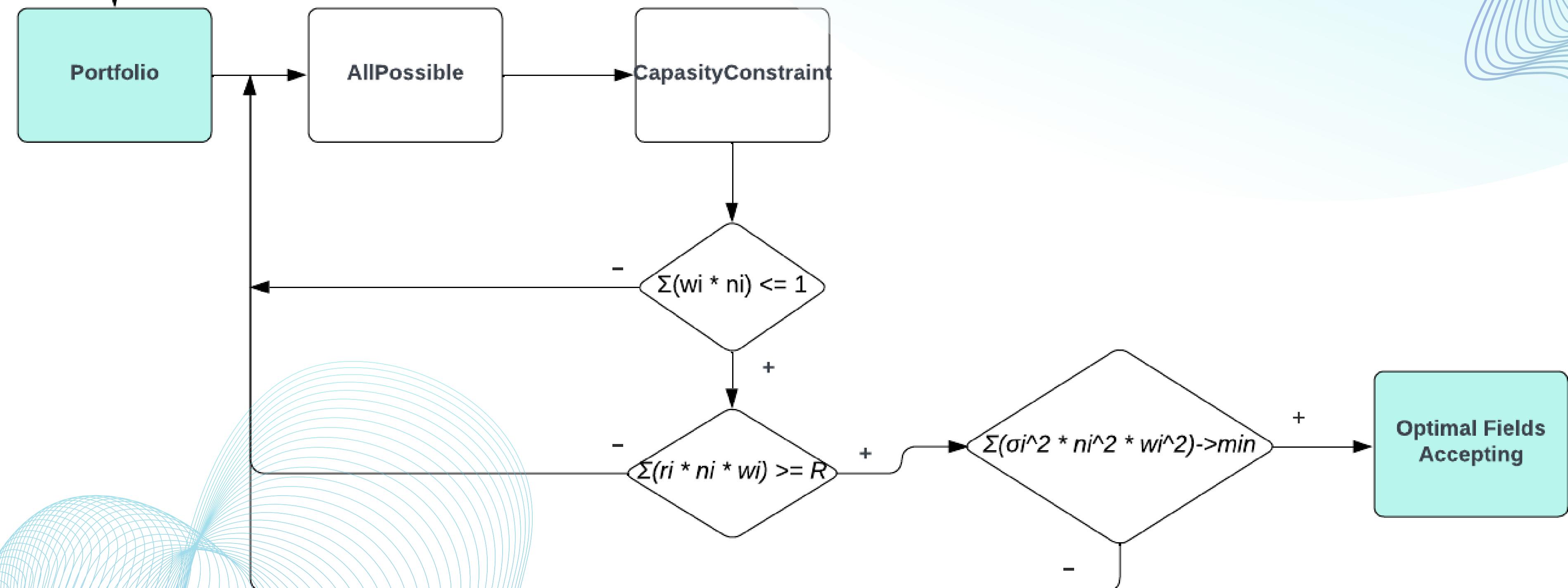
Average square profitability

$$\sum_{i=1}^N w_i * n_i \leq 1 \quad (3)$$

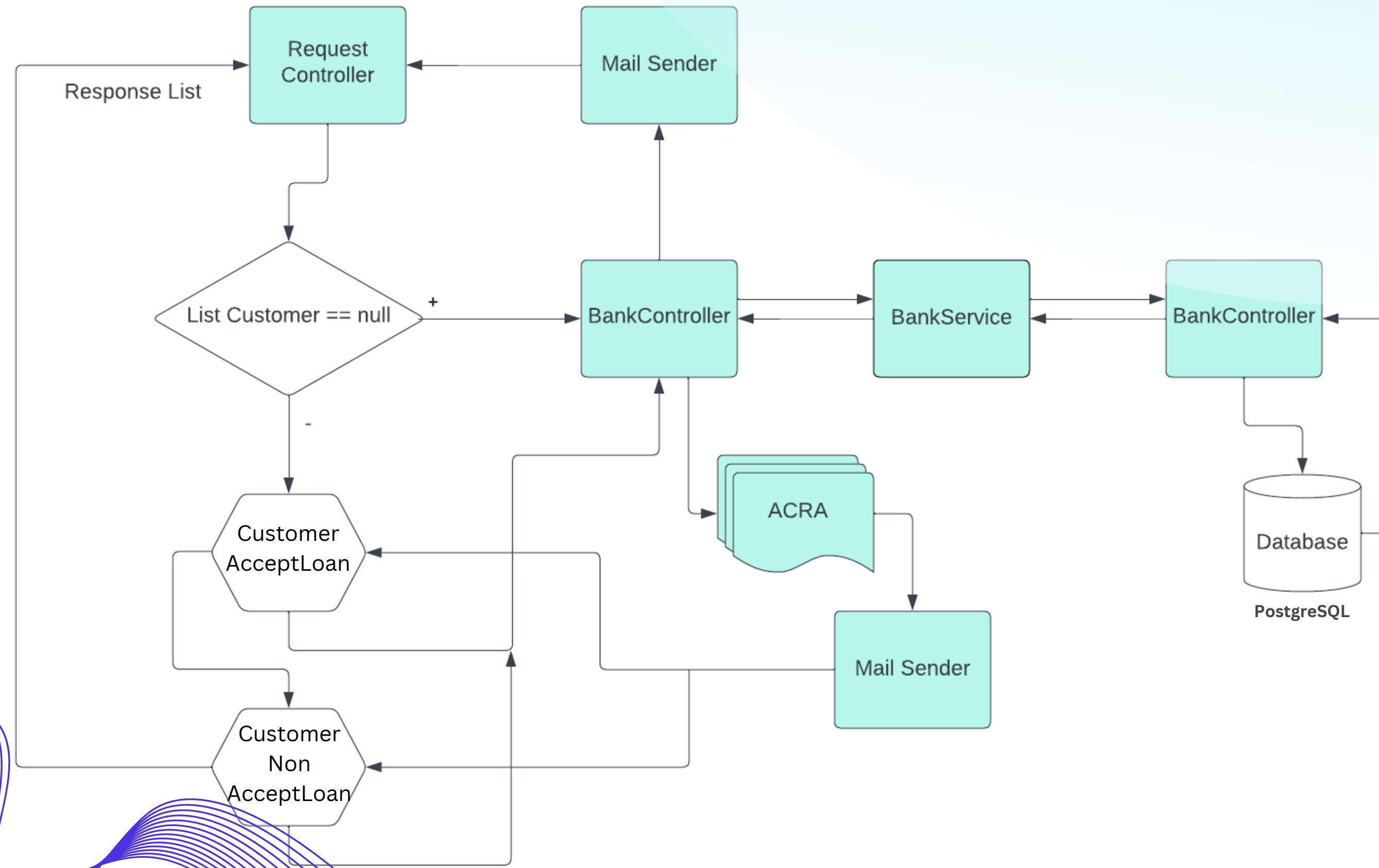
Constraint of capital

$$n_i \in \{0,1\}, i = \overline{1, N}$$

PORTFOLIO



CUSTOMER SAVING PROCESS



PORTFOLIO RESULT

	credit_time	customer_age	customer_income	loan_amount
1	24	21	370000	750000
2	30	32	400000	600000
3	60	21	280000	2000000
4	24	21	250000	450000
5	24	21	300000	560000
6	28	21	160000	400000
7	10	21	250000	350000
8	35	21	400000	500000
9	24	21	267900	362150
10	15	21	1500000	2000000

	y	id	credit_history_type	credit_type	first_name	last_name
	0	1	FAIR	MORTGAGE	Ani	Hakobyan
	1	2	FAIR	CREDIT	Mariam	Avetisyan
	0	3	FAIR	MORTGAGE	Tigran	Grigoryan
	1	4	FAIR	MORTGAGE	Sergey	Manucharyan
	1	5	FAIR	MORTGAGE	Angin	Abroyan
	1	6	FAIR	CREDIT	Hayk	Alekyan
	1	7	FAIR	MORTGAGE	Lilia	Azaryan
	1	8	FAIR	CREDIT	Lyudvig	Wolfram
	1	9	FAIR	CREDIT	Arin	Avaneusyan
	0	10	FAIR	CREDIT	Perj	Harutyunyan

Profitability of portfolio R = 0.072268

Risk of portfolio L = 0.001310

USED TECHNOLOGIES

-  Java (17)
-  Maven
-  Spring-boot microservices
-  Spring Data JPA
-  Spring Validation
-  Jakarta Validation
-  Hibernate, ORM
-  Rest API
-  Lombok
-  PDF generator
-  Mockito
-  Junit
-  Email sender
-  PostgreSQL
-  Swagger

PROJECT CONCLUSION

- Project timeline: 01.06.2023 - 30.06.2023
- Agile PM methodology: Scrum framework (daily standups, meetings, discussions, sprints)
- Github: Working with branches, code reviews, pull requests, merges



[Credit Management System](#)



[Project documentation](#)

**ANY
QUESTIONS ?**

