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GENERALIZED NET MODELLING OF REAL ESTATE BROKERAGE

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Summary: Generalized nets might be used for modelling, simulation and management of real processes, parallelly flowing in time. For this reason, they are a suitable tool for describing the processes taking place in a real estate agency.

Keywords: generalised nets, real estate.

1. Introduction

Real estate brokerage enjoys wide popularity in Bulgaria at present. Modelling these activities by means of the apparatus of generalized nets potentially yield a number of benefits:

- testing and improving the customer services;
- saving both employees' and customers' time, thus raising the efficiency of labour;
- detecting the weak points of the process, starting with the registration of offers and clients, to certifying contracts at the notary's office.

In general, the process constitutes in the following: when registering a new client, recorded are their personal data, phone for establishing further contact, detailed information of his demand and requirements. When registering an offer, search is made in the data base and in case of existence, the offer is not marked as a new one. Added is detailed real estate information, information about the owner etc.

Subsequently, the clients are real estate properties, responding to their requirements, and in case a client approves a property, there are experts (creditors, lawyers) who perform relevant checks and the contract of sell is certified in a notary's office.

2. Generalized net model

The real estate trade activity might be represented via the following generalized net model (GN model).

The GN model contains the following set of transitions:

$$A = \{ Z_1, Z_2, Z_3, Z_4, Z_5, Z_6 Z_7\},$$

which describe the processes:

- transition Z_1 – registering a new client who wishes to purchase a real estate property and defining the client's demands and requirements;
- transition Z_2 – making offers to clients
- transition Z_3 – in case of two clients with same demands, determining who of them will be sold the property;

- transition Z_4 – determining whether the client, who is purchasing the property, covers the requirements of the property's owner;

- transition Z_5 – check by experts (lawyers, creditors) whether the client may purchase the property;

- transition Z_6 – certifying the contract at the notary's office and declaring the property as sold;

- transition Z_7 – registering offers.

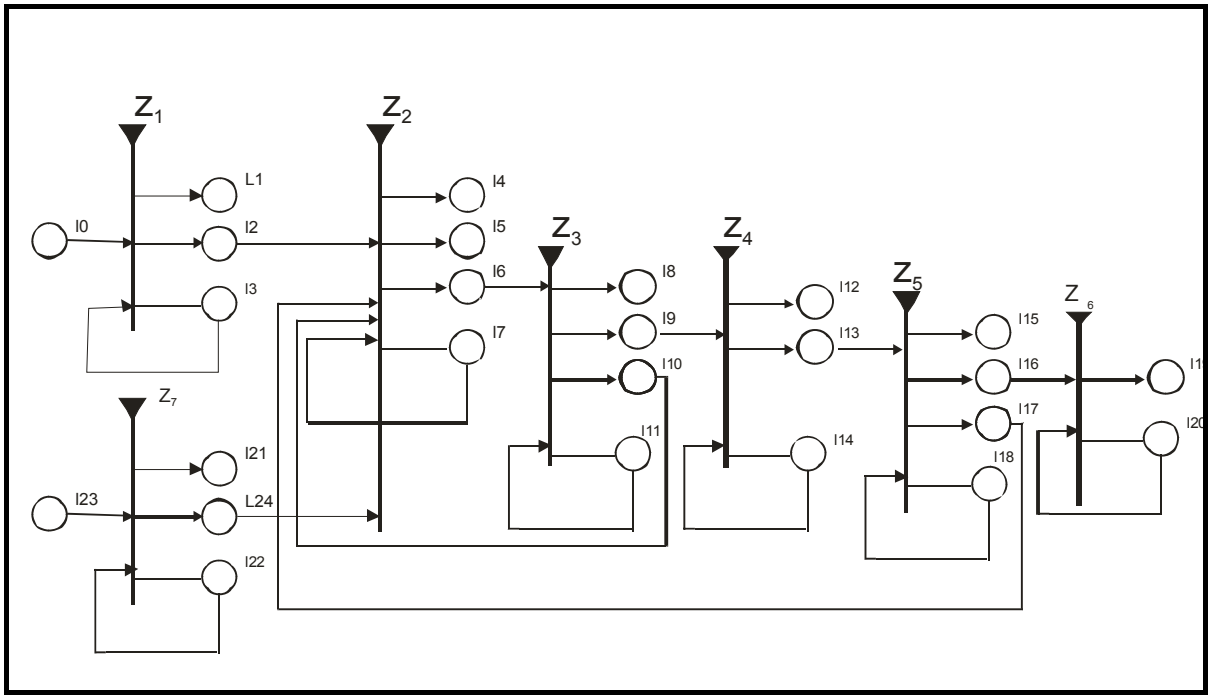

Fig.1. Generalized net model

In place l_0 – a new client enters".

Transition Z_1, describing the clients' registration and the definition of their requirements, is of the following form:

$Z_1 = < \{l_0, l_3\}, \{ l_1, l_2, l_3\}, r_1, V (l_0, l_3)>$

The tokens entering place l_2 feature the following characteristic:

l_2 - "< client, requirements>"

In place l_3 one μ-token stays, with the characteristic "clients database".

		l_1	l_2	l_3
r_1=	l_0	$W_{0,1}$	false	true
	l_3	True	true	true

where:

$W_{0,1}$ = „The client withholds, or they already exist in the clients database (already registered)"

In place l_{23} – „a new real estate property offer is received".

Transition Z_7 describing the receipt of a new offer, has the following form:

$Z_7 = < \{l_{23}, l_{22}\}, \{l_{21}, l_{22}, l_{24} \}, r_7, V (l_{22}, l_{23})>$

The tokens entering places possess the following characteristics:

In place l_{21} - "the offer is already recorded in the offers database",

in place l_{24} – "< real estate property, features>".

In place l_{22} one σ-token stays, with characteristic "offers database".

r_7=		l_{21}	L_{22}	l_{24}
	l_{23}	$W_{23,21}$	true	false
	l_{22}	true	false	true

where:
$W_{23,21}$ = “The offer is already recorded in the offers database, or it is no longer valid ”.

Transition Z_2 has the form:

$Z_2 = < \{l_{24}, l_2, l_7, l_{10}, l_{17}\}, \{ l_4, l_5, l_6, l_7\}, r_2, V (l_1, l_2, l_7, l_{10}, l_{17})>$

The tokens entering places possess the following characteristics:

In place l_{10} - “the current client cannot purchase the desired real estate property and returns at the stage of posting new offers ”;

l_{17} - “experts judge that the current client may not purchase this real estate property”;

l_4 - “the offer is no longer valid” – the owner has withdrawn the selling offer or has already sold it via another real estate agency or individual broker

l_5 - “the current client withholds”;

l_6 - “current client, suitable current offer”;

l_7 - “registering in the data base that the current client is satisfied with the current offer (i.e. wishes to purchase the property)”.

r_2=		l_4	l_5	l_6	l_7
	l_{24}	true	false	false	$W_{24,7}$
	l_2	$W_{2,4}$	$w_{2,5}$	false	false
	l_7	false	$w_{7,5}$	$W_{7,6}$	false
	l_{10}	false	$w_{2,5}$	$w_{10,6}$	false
	l_{17}	false	$w_{2,5}$	$w_{17,6}$	false

where:

$W_{2,4}$ = “The current client withholds”;

$W_{2,5}$ = “The current offer is withdrawn”;

$W_{2,7}$ = “Criteria for selecting a client for the current offer (in case of more than one suitable clients per property)”;

$W_{7,5} = W_{2,5}$;

$W_{7,6}$ = “The current offer suits well the current client”;

$W_{10,6} = W_{17,6} = W_{7,6}$.

Transition Z_3 has the form:

$Z_3 = <\{l_6, l_{11}\},\{l_8, l_9, l_{10,} l_{11}\}, r_3, \wedge(l_6, l_{11})>$

The tokens possess the following characteristics:

l_{11} – “Criteria for selecting a client to purchase the current real estate property (in case of more than one clients who desire the property)”;

l_8 – “the current client withdraws or the current offer is no longer valid”;

l_9 – “the current client will purchase the current real estate property”;

r_3=		l_8	l_9	l_{10}	l_{11}
	l_6	$w_{6,8}$	false	$w_{6,10}$	$w_{6,11}$
	l_{11}	true	$w_{11,9}$	$w_{11,10}$	false

where:

$W_{6,8}$ = “The current client withdraws or the current offer is no longer valid ”;

$W_{6,10}$ = “The current client cannot purchase the property”;

$W_{6,11}$ = "Check in the database for clients who may purchase the current real estate property;

$W_{11,9}$ = "The current client will purchase the current real estate property";

$W_{11,10}$ = "The current client cannot purchase the current real estate property".

Transition Z4 has the form:

$Z_4 = <\{l_9, l_{14}\}, \{l_{12}, l_{13}, l_{14}\}, r_4, \wedge(l_9, l_{14})>$

The tokens entering the places possess the following characteristics:

l_{14} – "check whether the current client covers the owner's requirements";

l_{12} – "the current client declines the purchase or the current offer is withdrawn";

l_{13} – "the current client will purchase the current real estate property (no matter is the property owners' requirements are covered or not)";

		l_{12}	l_{13}	L_{14}
r_4=	L_9	$w_{9,12}$	false	$w_{9,14}$
	l_{14}	true	$w_{14,13}$	false

where:

$W_{9,12}$ = "The current client withdraws or the offer is no longer valid";

$W_{9,14}$ = "The current client covers the property owner's requirements";

$W_{14,13} = W_{9,14}$.

Transition Z_5 has the form:

$Z_5 = <\{l_{13}, l_{18}\}, \{l_{15}, l_{16}, l_{17}, l_{18}\}, r_5, \wedge(l_{13}, l_{18})>$

The tokens entering places possess the following characteristics:

l_{18} – "Check whether the current client may purchase the property";

l_{15} – "the current client declines the purchase, or the current property is no longer for sale";

l_{16} – "the current client will purchase the current real estate property ";

		l_{15}	l_{16}	l_{17}	L_{18}
r_5=	L_{13}	$w_{13,15}$	false	$w_{13,17}$	$w_{13,18}$
	l_{18}	true	$w_{18,16}$	$w_{18,17}$	false

where:

$W_{13,15}$ = " The current client declines the offer, or the offer is no longer valid";

$W_{13,17}$ = "The current client cannot purchase the real estate property";

$W_{13,18}$ = "Check by experts (lawyers, creditors) regarding the client's capacity of purchasing the real estate property";

$W_{18,16}$ = "The current client will purchase the current real estate property";

$W_{18,17}$ = "The current client cannot purchase the current real estate property".

Transition Z_6 has the form:

$Z_6 = <\{l_{16}, l_{20}\}, \{l_{19}, l_{20}\}, r_6, V(l_{16}, l_{20})>$

The tokens entering places possess the following characteristics:

l_{20} – "the current client purchases the current real estate property and registers a sell";

l_{19} – "the current client declines the purchase, or the current property is no longer for sale";

		l_{19}	l_{20}
r_6=	l_{16}	$w_{16,19}$	$w_{16,20}$
	l_{20}	false	false

where:

$W_{16,19}$ = "The current client declines the offer, or the offer is no longer valid";

$W_{16,20}$ = "Registration of the sale in the archive".

3. Conclusion

The so developed generalized net offers the possibility to test real estates trade related systems. Making offers is considered separately from demand, since both processes are flowing parallelly in time.

The model allows extension. Any of the described processes or certain places may be substituted by a new models, applying the hierarchical operators from the generalized nets theory. The interaction between the separate officers and institutions may be further considered.

REFERENCES

[1] Atanassov, K., Generalized Nets, World Scientific, Singapore, 1991.

[2] Atanassov, K., H. Aladjov. Generalized Nets in Artificial Intelligence. Vol.2: Generalized Nets and Machine Learning. "Prof. M. Drinov" Academic Publishing House, Sofia, 2001.

[3] Orozova-Langova D., H. Aladjov, K. Atanassov, Generalized Net For Machine Learning With Current Estimations, Advanced Studies in Contemporary Mathematics, Ku-Duk Press, vol.3, 2001, No2, pp.61-76.