парадигмы разные нужны,
парадигмы разные важны

ЛЕКЦИЯ №2 СИСТЕМЫ ПЕРЕПИСЫВАНИЯ ТЕРМОВ

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APS&IMSAPS&IMS,
Lectures

REWRITING TERM SYSTEMS

- Term rewriting technique, which is the base of algebraic programming has a long history starting from 60-th but only recently programming systems supporting rewriting and rewriting logic become popular.

- MOUDE developed in CSL of Stanford Research Institute (H.Meseguer);

- ELAN developed in INRIA Nancy (K.Kirchner)

- KAFE-OBJ developed in JAIST, Japan (Kokichi Futatsugi)

- ATERM and STRATEGO developed in Programming Research Group, University of Amsterdam

REWRITING TERM SYSTEMS

- The first language with rewriting for computer algebra was Analitic (1968-70). First implemented in computers MIR.

APS SYSTEM

- APS – is a **A**lgebraic **P**rogramming **S**ystem have developed in Glushkov Institute of Cybernetics (dep. 100,105). The author of idia is prof. Alexander Letichevsky.

- APS – is a first system which have used separately the notions Strategy with System of Rewrite Rules.

- APS – is one of system of rewriting term which have procedural part, self-modification, dynamic creation of procedures and system of rewriting rules, possibilities to adding new language extensions.

APS SYSTEM

№	System names	Fibonacci number (in seconds)					
		15	20	21	22	23	24
1	Interpreter of ELAN	0	2	6	11.5	18.5	28
2	Interpreter of Stratego	0	3	7	12	21	34
3	Interpreter of MAUDE	0.004	0.04	0.068	0.072	0.104	0.236
4	Procedures of APS	0	1	1	3	4	7
5	Rewriting systems of APS	0	2	2	4	6	10

REWRITING TERM SYSTEMS

Features	CAFÉ-OBJ	Maude	ELAN	APS
Imperative programming	1	1	2	5
Simulation	0	0	0	4
Associative-commutative rewriting	4	5	4	4
Completion	1	3	3	3
Constraint solving	0	0	4	4
Concurrency	3	5	2	4
Dealing with non-canonical systems rewriting rules	1	1	2	5
Groebner basis computation	0	0	4	4
Sound semantics of computation	4	5	4	4
Partial evaluation technique	0	0	0	3
Ordering	5	5	5	5
Object-oriented programming	2	3	2	4
Integration with logic programming	5	1	4	4
TOTAL:	**26**	**29**	**36**	**53**

REWRITING TERM SYSTEMS

No	Name	Strategies Number	None Typing Strategies and rules	Functional Language	Possibilities of Language Extension	User Manual Publication	Connection to the External Modules	Compilation	Dynamical Creation of the System of the Rewriting Rules	Support	Commercial Products	Country
1	ELAN	arbitrary	-	-	+	1992	-	+,-	-	+	Can't find any information about concrete projects	France
2	STRATEGO	arbitrary	+	-	-	1994	-	+,-	+	-	Can't find any information about concrete projects	Netherlands
3	MAUDE	7	+	-	-	1995	-	+,-	-	+	Can't find any information about concrete projects	USA
4	APS	arbitrary	+	+	+	1987	To the binary files and system commands	C – version of the arbitrary paths of program	+	+	VRS (Verification of Requirement Specification), TERM(School System of Computer Algebra)	Ukraine

ALGEBRAIC PROGRAMMING SYSTEM APS

- Algebraic Programming System APS [1] was developed by the departments 100,105 of Glushkov Institute of Cybernetics of the National Academy of Science of Ukraine [2] in 1987.

- APS is the first system of term rewriting which used the RRS and strategies separately.

- APLAN – is the language of APS (**A**lgebraic **P**rogramming **LAN**guage).

ALGEBRAIC PROGRAMMING SYSTEM APS

Advantages:

- Procedural interpretator.
- Fast rewriting with dynamic updation of s.r.r.
- APLAN language is look's like C++.
- Possibilities of realization own strategies.
- Possibilities of language enhancements.
- Possibilities of integration with external tools.
- Self modification of any parts of a APLAN program.
- Dynamical creation of procedures and s.r.r.
- etc

ALGEBRAIC PROGRAMMING SYSTEM APS

Application:

- Rewriting in APS

- Insertion Modelling System IMS

- School Systems of Computer Algebra (KSUSchool Systems of Computer Algebra (KSU,TerM)

- Verification of Requirement Specification (ICYBVerification of Requirement Specification (ICYB, ISSVerification of Requirement Specification (ICYB, ISS, UniqueSoft LLCVerification of Requirement Specification (ICYB, ISS, UniqueSoft LLC, VRS)