DNA Sequencing Informatics Framework Using [CoqTP/q*cert/CRSX-HACS/Java/Ocaml/JikesRVM/(RVM-Research Virtual Machine)] in the Context of [IoT/HPC/Cloud Computing/JIProlog/Owl] Hi-End Complex Environments – An Interesting insight into the Technically Challenging R&D domains involving Nano-Bio Systems.

[Towards AI/ML/DL based Interfacing of Engineering/Physics/Biology/Medicine Domain Platforms]
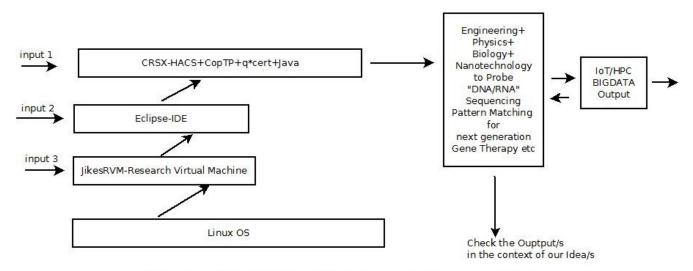
Nirmal Tej Kumar
Independent Consultant - Informatics/Photonics/Nanotechnology R&D.
R&D Collaborator - USA/UK/Israel/Armenia/Brazil.
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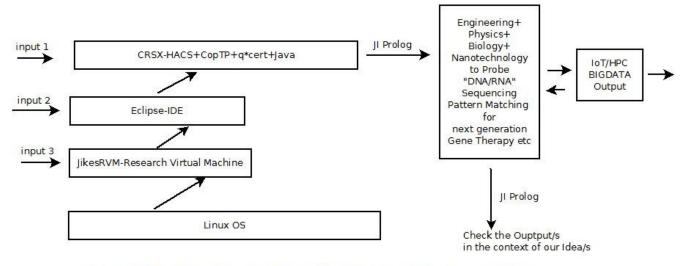## [I] Introduction & Inspiration :

{ Approximate Informatic Framework in the Context of Nano-Bio Systems & their Applications
based on DNA/RNA Sequencing for Next Generation AI based Complex Systems }
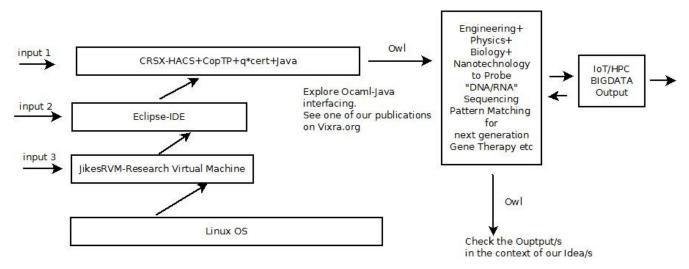Please Check the Scientific Literature & Satisfy Yourself.
Thanks.

Figure I - **{ DNA Informatics R&D Framework & Implementation as per our TITLE }**
{ Informatics of Anticipatory Medicine in the Context of AI/ML/DL}
{ Drug Delivery Systems/Gene Therapy/Gene Chips/Pattern
Matching/Controlled Release Systems Applications/Medical Imaging }
{ http://drops.dagstuhl.de/opus/volltexte/2015/5237/ }
[Algorithm I]
[General Approach Towards Testing Specific Algorithms/fine tuning is needed]
Please Make a Note : Rigorous Testing in Progress at the time of submission.

Figure II – { JI Prolog Based Informatics Framework/IoT/HPC/BIGDATA }
{ Fine Tuning is needed for all our informatics frameworks. Reading literature is needed }
[Algorithm II]

Figure III - { Owl-Ocaml Based Informatics Framework/IoT/HPC/BIGDATA }
{ Fine Tuning is needed for all our informatics frameworks. Reading literature is needed }
[Algorithm III]

Simple Implementations based on Figures [I] [II] & [III] mentioned above :

[A] *[Lambda Calculus/Java] + CRSX-HACS System+CopTP+q*cert → Probe Nano-Bio Systems & Applications.[e.g. DNA Sequencing for bio-sensing etc...]*

Implementations could be done using Algorithm [I],[II] or [III] individually or in combination/s.

[B] *[CAMP/q*cert] + CRSX-HACS System+CopTP+q*cert → Probe Nano-Bio Systems & Applications.[e.g. DNA Seqeucnig for Gene-Chips etc...]*

Implementations could be done using Algorithm [I] [II] or [III] individually or in combination/s.

Please see useful links :

[a] *https://github.com/noti0na1/LambdaCalculus-java*

[b] *https://querycert.github.io/html/Qcert.CAMP.Lang.CAMP.html#camp*

[III] DNA Information on Mathematics & Software Used/Useful :

[a] http://vixra.org/author/nirmal_tej_kumar

[b] http://vixra.org/author/nirmal

[c] http://vixra.org/author/n_t_kumar

[d] http://vixra.org/author/d_n_t_kumar

[e] An Introduction to the Recursion Theory Framework for DNA-Based Applications in Bio-Molecular Computing and Information Processing Using the (HOL) Higher Order Logic System -
{ Article DOI : 10.5958/0975-8089.2015.00006.8 }

[f] https://link.springer.com/book/10.1007%2F978-3-319-19446-2

[g] https://www.semanticscholar.org/author/Nirmal-Tej-Kumar/12354503/suggest

[h] An Informatics Technical Note on Interaction of DNA – Graphene Chemical Sensor System as Reaction–Diffusion Wave-Based Computing System in Ionised Gaseous environments and their Applications Using Theoretical Studies and Scientific Computation Overview -
{ Article DOI: 10.5958/0975-8089.2014.00013.X }

[i] DNA for nano-bio scale computation of chemical formalisms using Higher Order Logic (HOL) and analysis using an interdisciplinary approach. *Mat. Res.* [online]. 2014, vol.17, n.6, pp.1391-1396.Epub July04, 2014. ISSN 1516-1439.
{ Article DOI - http://dx.doi.org/10.1590/S1516-14392014005000098 }

[j] Kumar DNT ; QIAO, HUI ; WEI, QUFU ; KOST, Y. . Nucleic Acids Data Sequencing using Higher Order Logic-A Suggestion of Basic Computational Framework Towards Bio-Sensors and Gene-Chips Design, Implementation and Verification. Journal of Applied Mathematics and Bioinformatics(JAMB) , v. 2, p. 65-79, 2012.

[k] KUMAR, D.N.T. ; JING, LI ; WEI, QUFU. . An Insight into Calculus of Communicating System and Formalisms, for Bioinspired Logic Device Design using Computational Aspects of Protocells. International Journal of Applied Research on Information Technology and Computing , v. 3, p. 70, 2012.

[l] KUMAR, D.N.T. ; WEI, QUFU ; QIAO, HUI ; LI, JING ; ZHANG, MIN . Computational Analysis of Logic Gates and Circuits Derived from Gene Systems Using Quantified Boolean Formula Methodology in CNF Format. International Journal of Applied Research on Information Technology and Computing , v. 3, p. 145-156, 2012.

[m] Kumar DNT ; WEI, QUFU ; KOST, Y. . A Survey of Support Vector Machines and an Analysis of DNA Methylation Information Processing using an SVM based Online Methylator Software.. JCIB , v. 4, p. 173-181, 2011.

[n] DIVAKU, N. T. K. ; WEI, QUFU ; KOST, Y. . RNA Inspired Genetic Logic Devices and Functional Verification based on Calculus for Communicating Systems (CCS) Approach using Formalisms.. JCIB , v. 4, p. 183-192, 2011.

[o] *www.informatik.uni-jena.de/~dittrich//p/MCD2005.pdf*

[p] https://arxiv.org/abs/q-bio/0501016

[q] https://www.biosys.uni-jena.de/Research/Chemical+Organization+Theory.html

[r] https://www.biosys.uni-jena.de/Publications.html

[IV] { CRSX – HACS/Java/JikesRVM/JIProlog/Eclipse/CoqTP/q*cert } - Related References :

[a] *https://github.com/crsx/crsx/wiki/HACS*

[b] https://github.com/crsx/crsx/wiki

[c] https://github.com/crsx/crsx/wiki/Tutorials

[d] https://www.eclipse.org/

[e] https://en.wikipedia.org/wiki/Java_(software_platform)

[f] *https://www.jikesrvm.org/ && http://dmakarov.github.io/work/guide/*

[g] *www.jiprolog.com && [h] https://coq.inria.fr/ && [i] https://querycert.github.io/*

[h] *https://cs.nyu.edu/courses/spring14/CSCI-GA.2130-001/hacs-gently.pdf*

[i] *https://github.com/owlbarn && [j] https://github.com/owlbarn/owl*

[k] *http://ocaml.xyz/ - owlbarn Software for ML etc….*

[l] *http://drops.dagstuhl.de/opus/volltexte/2015/5237/pdf/27.pdf*

**** *" Special R&D Focus is on : [http://www.nadin.ws/archives/2926] "* - Medicine: The Decisive Test of Anticipation/© Springer International Publishing Switzerland 2017 - M. Nadin (ed.), Anticipation and Medicine, DOI 10.1007/978-3-319-45142-8_1.

https://www.twosigma.com/insights/article/technical-report-introduction-to-compiler-generation-using-hacs/

https://github.com/crsx/hacs/blob/master/doc/hacs-padl.tex

http://theconversation.com/ai-doctors-and-engineers-are-coming-but-they-wont-be-stealing-high-skill-jobs-101701

https://spectrum.ieee.org/at-work/education/tomorrows-doctors-must-be-engineers-too

https://www.theverge.com/2018/.../google-verily-ai-algorithm-eye-scan-heart-disease-

https://www.sciencedaily.com/news/computers_math/robotics

https://en.wikipedia.org/wiki/Artificial_intelligence_in_healthcare

https://disi.unibo.it/en/research/areas/artificial-intelligence-autonomic-and-complex-systems

https://dzone.com/articles/ai-algorithms-to-solve-complex-systems

https://pdfs.semanticscholar.org/10e3/aaa40d8a504cf9a3593bf6512d1675cf5576.pdf

https://link.springer.com/chapter/10.1007/978-3-662-03305-0_5

https://uib.ai/artificial-intelligence-and-complex-systems/

https://www.uu.nl/en/research/artificial-intelligence/simulation-of-complex-systems

www.cs.utexas.edu/users/ai-lab/?EPG

https://blogg.hioa.no/complex/

https://learning-systems.org/research ********

[V] Acknowledgment/s :

THE END.