Paper Reading Assignment #3 (due on 11/25)

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1. Read the papers assigned to you. You are encouraged to read more papers or even find other related papers that are not provided by me, list them as references of your summary.

2. Try to focus on the following issues:
    a. Understand the background/requirements
    b. Learn from the author(s) in problem solving
    c. Study computational complexity of the algorithms
    d. Your creative ideas
    e. (Bonus) Source code of some algorithms are available from http://security.riit.tsinghua.edu.cn, or ask TA, you are encouraged to try them out or implement those algorithms not on the website. A demo of statistics, a tool to generate dynamic/geometric view of date structure (such as decision tree), or other experiments of your own ideas will help fully understand the problem.

3. Write your summary in your own words based on your own understanding. Use quotation marks or reference points when you quote or reference to the papers.

4. Anyone who is interested in the implementation and/or simulation of the newly emerged hardware algorithms please contact TA. This work can obtain bonus to the final score, or just be taken as the final project of this course.

Students: 2018400404, 2018403381, 2018280070, 2018400413, 2018403322, 2018280582, 2015011012.

Assignment:

Survey [1]: Required for above students.

vCRIB[8]

- 2018400404

One Big Switch[10]

- 2018403381

Network Update[17]

- 2018280070

PGA[19]

- 2018400413

Composing SDN[18]

- 2018403322

HSA[12]

- 2018280582

AP Verifier[15]

- 2015011012

and others: optional for all.

Survey

[1] R. Boutaba, and I. Aib, “Policy-based management: A historical perspective,” Journal of Network and Systems Management, vol. 15, no. 4, pp. 447-480, 2007.

[2] Z. Liu, X. Wang, and J. Li, “From CIA to PDR: A Top-Down Survey of SDN Security for Cloud DCN,” ZTE Communications, no. 1, pp. 011, 2016.

Analysis

[3] M.G. Gouda, and X.Y. Liu, “Firewall design: Consistency, completeness, and compactness,” in Proceedings of IEEE ICDCS, 2004.

[4] E.S. Al-Shaer, and H.H. Hamed, “Modeling and management of firewall policies,” IEEE Transactions on Network and Service Management, vol. 1, no. 1, pp. 2-10, 2004.

[5] E. Al-Shaer, H. Hamed, R. Boutaba, and M. Hasan, “Conflict classification and analysis of distributed firewall policies,” IEEE journal on Selected Areas in Communications, vol. 23, no. 10, pp. 2069-2084, 2005.

[6] X. Wang, W. Shi, Y. Xiang, and J. Li, “Efficient network security policy enforcement with policy space analysis”, IEEE/ACM Transactions on Networking, vol. 24, no. 5, 2016.

Placement

[7] M. Yu, J. Rexford, M.J. Freedman, and J. Wang, “Scalable flow-based networking with DIFANE,” ACM SIGCOMM Computer Communication Review, vol. 40, no. 4, pp.351-362, 2010.

[8] M. Moshref, M. Yu, A. Sharma, and R. Govindan, “Scalable rule management for data centers,” in Proceedings of NSDI, 2013.

[9] Y. Kanizo, D. Hay, and I. Keslassy, “Palette: Distributing tables in software-defined networks,” in Proceedings of IEEE INFOCOM, 2013.

[10] N. Kang, Z. Liu, J. Rexford, and D. Walker, “Optimizing the one big switch abstraction in software-defined networks,” in Proceedings of ACM CoNEXT, 2013.

[11] Z.A. Qazi, C.C. Tu, L. Chiang, R. Miao, V. Sekar, and M. Yu, “SIMPLE-fying middlebox policy enforcement using SDN,” ACM SIGCOMM Computer Communication Review, vol. 43, no. 4, pp. 27-38, 2013.

Verification

[12] P. Kazemian, G. Varghese, and N. McKeown, “Header space analysis: Static checking for networks,” in Proceedings of NSDI, 2012.

[13] P. Kazemian, M. Chang, H. Zeng, G. Varghese, N. McKeown, and S. Whyte, “Real time network policy checking using header space analysis,” in Proceedings of NSDI, 2013.

[14] A. Khurshid, X. Zou, W. Zhou, M. Caesar, and P.B. Godfrey, “Veriflow: verifying network-wide invariants in real time,” in Proceedings of NSDI, 2013.

[15] A. Fogel, S. Fung, L. Pedrosa, M. Walraed-Sullivan, R. Govindan, R. Mahajan, and T. Millstein, “A General Approach to Network Configuration Analysis,” in Proceedings of NSDI, 2015.

[16] H. Yang, and S.S. Lam, “Real-time verification of network properties using atomic predicates,” IEEE/ACM Transactions on Networking, vol. 24, no. 2, pp.887-900, 2016.

[17] R. Beckett, A. Gupta, R. Mahajan, and D. Walker, “A General Approach to Network Configuration Verification,” in Proceedings of ACM SIGCOMM, 2017.

Other Topics (update [19][20], composition [21][23], definition [18] [22])

[18] T.L. Hinrichs, N.S. Gude, M. Casado, J.C. Mitchell, and S. Shenker, “Practical declarative network management,” in Proceedings of ACM workshop on Research on enterprise networking (WREN), 2009.

[19] M. Reitblatt, N. Foster, J. Rexford, C. Schlesinger, and D. Walker, “Abstractions for network update,” in Proceedings of ACM SIGCOMM, 2012.

[20] W. Zhou, D. Jin, J. Croft, M, Caesar, and P. B. Godfrey, “Enforcing Customizable Consistency Properties in Software-Defined Networks,” in Proceedings of NSDI, 2015.

[21] C. Monsanto, J. Reich, N. Foster, J. Rexford, and D. Walker, “Composing software defined networks,” in Proceedings of NSDI, 2013.

[22] C. Prakash, J. Lee, Y. Turner, J.M. Kang, A. Akella, S. Banerjee, C. Clark, Y. Ma, P. Sharma, and Y. Zhang, “PGA: Using graphs to express and automatically reconcile network policies,” ACM SIGCOMM Computer Communication Review, vol. 45, no. 4, pp. 29-42, 2015.

[23] M.T. Arashloo, Y. Koral, M. Greenberg, J. Rexford, and D. Walker, “SNAP: Stateful network-wide abstractions for packet processing,” in Proceedings of SIGCOMM, 2016.