

REFERENCES

- [1] A. Abhashkumar, A. Gember-Jacobson, and A. Akella. Tiramisu: Fast multilayer network verification. In R. Bhagwan and G. Porter, editors, *17th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2020, Santa Clara, CA, USA, February 25-27, 2020*, pages 201–219. USENIX Association, 2020.
- [2] A. Abhashkumar, J. Kang, S. Banerjee, A. Akella, Y. Zhang, and W. Wu. Supporting diverse dynamic intent-based policies using janus. In *Proceedings of the 13th International Conference on emerging Networking EXperiments and Technologies, CoNEXT 2017, Incheon, Republic of Korea, December 12 - 15, 2017*, pages 296–309. ACM, 2017.
- [3] Amazon. Aws post-event summaries. <https://aws.amazon.com/cn/premiumsupport/technology/pes/>, June 2020.
- [4] R. Beckett, A. Gupta, R. Mahajan, and D. Walker. A general approach to network configuration verification. In *Proceedings of the Conference of the ACM Special Interest Group on Data Communication, SIGCOMM 2017, Los Angeles, CA, USA, August 21-25, 2017*, pages 155–168. ACM, 2017.
- [5] M. Canini, D. Venzano, P. Peresini, D. Kostic, and J. Rexford. A NICE way to test openflow applications. In S. D. Gribble and D. Katabi, editors, *Proceedings of the 9th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2012, San Jose, CA, USA, April 25-27, 2012*, pages 127–140. USENIX Association, 2012.
- [6] R. Cavada, A. Cimatti, M. Dorigatti, A. Griggio, A. Mariotti, A. Micheli, S. Mover, M. Roveri, and S. Tonetta. The nuxmv symbolic model checker. In A. Biere and R. Bloem, editors, *Computer Aided Verification - 26th International Conference, CAV 2014, Held as Part of the Vienna Summer of Logic, VSL 2014, Vienna, Austria, July 18-22, 2014. Proceedings*, volume 8559 of *Lecture Notes in Computer Science*, pages 334–342. Springer, 2014.
- [7] Cisco. Cisco automated fault management. <https://www.cisco.com/c/dam/en/us/services/collateral/services/bcs-afm-aag.pdf>, August 2018.
- [8] CloudFormation. Aws cloud: formation model and provision all your cloud infrastructure resources. <https://aws.amazon.com/cloudformation/>, June 2020.
- [9] T. Gehr, S. Misailovic, P. Tsankov, L. Vanbever, P. Wiesmann, and M. T. Vechev. Bayonet: probabilistic inference for networks. In J. S. Foster and D. Grossman, editors, *Proceedings of the 39th ACM SIGPLAN Conference on Programming Language Design and Implementation, PLDI 2018, Philadelphia, PA, USA, June 18-22, 2018*, pages 586–602. ACM, 2018.
- [10] Github. Github of kubernetede descheduler. <https://github.com/kubernetes-sigs/descheduler>, June 2020.
- [11] Github. Hpa v2 scales up deployment during rolling updates 90461. <https://github.com/kubernetes/kubernetes/issues/90461>, June 2020.
- [12] Github. Replicaset controller bug: continuously creating pod to tainted nodes 75913. <https://github.com/kubernetes/kubernetes/issues/75913>, June 2020.
- [13] Google. Google cloud incident reports. <https://status.cloud.google.com/summary>, June 2020.
- [14] C. Hawblitzel, J. Howell, M. Kapritsos, J. R. Lorch, B. Parno, M. L. Roberts, S. T. V. Setty, and B. Zill. Ironfleet: proving practical distributed systems correct. In E. L. Miller and S. Hand, editors, *Proceedings of the 25th Symposium on Operating Systems Principles, SOSP 2015, Monterey, CA, USA, October 4-7, 2015*, pages 1–17. ACM, 2015.
- [15] A. Horn, A. Kheradmand, and M. R. Prasad. Delta-net: Real-time network verification using atoms. In A. Akella and J. Howell, editors, *14th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2017, Boston, MA, USA, March 27-29, 2017*, pages 735–749. USENIX Association, 2017.
- [16] A. Horn, A. Kheradmand, and M. R. Prasad. A precise and expressive lattice-theoretical framework for efficient network verification. In *27th IEEE International Conference on Network Protocols, ICNP 2019, Chicago, IL, USA, October 8-10, 2019*, pages 1–12. IEEE, 2019.
- [17] Istio. Istio: connect, secure, control, and observe services. <https://istio.io/>, June 2020.
- [18] S. Jain, A. Kumar, S. Mandal, J. Ong, L. Poutievski, A. Singh, S. Venkata, J. Wanderer, J. Zhou, M. Zhu, J. Zolla, U. Hölzle, S. Stuart, and A. Vahdat. B4: experience with a globally-deployed software defined wan. In D. M. Chiu, J. Wang, P. Barford, and S. Seshan, editors, *ACM SIGCOMM 2013 Conference, SIGCOMM'13, Hong Kong, China, August 12-16, 2013*, pages 3–14. ACM, 2013.
- [19] G. Junival, N. Björner, R. Mahajan, S. Seshia, and G. Varghese. Quantitative network analysis. *Technical report*, 2016.
- [20] A. Kheradmand. Automatic inference of high-level network intents by mining forwarding patterns. In *SOSR '20: Symposium on SDN Research, San Jose, CA, USA, March 3, 2020*, pages 27–33. ACM, 2020.
- [21] A. Kheradmand. Case study implementation details. <https://github.com/kheradmand/verdict-hotnets20>, 2020.
- [22] A. Kheradmand and G. Rosu. P4K: A formal semantics of P4 and applications. *CoRR*, abs/1804.01468, 2018.
- [23] H. Kim, J. Reich, A. Gupta, M. Shahbaz, N. Feamster, and R. J. Clark. Kinetic: Verifiable dynamic network control. In *12th USENIX Symposium on Networked Systems Design and Implementation, NSDI 15, Oakland, CA, USA, May 4-6, 2015*, pages 59–72. USENIX Association, 2015.
- [24] Kubernetes. Kubernetes: Production-grade container orchestration. <https://kubernetes.io/>, June 2020.
- [25] Kubernetes-sigs. Descheduler. <https://github.com/kubernetes-sigs/descheduler>, June 2020.
- [26] L. Ma, D. V. Aken, A. Hefny, G. Mezerhane, A. Pavlo, and G. J. Gordon. Query-based workload forecasting for self-driving database management systems. In G. Das, C. M. Jermaine, and P. A. Bernstein, editors, *Proceedings of the 2018 International Conference on Management of Data, SIGMOD Conference 2018, Houston, TX, USA, June 10-15, 2018*, pages 631–645. ACM, 2018.
- [27] Google. Google bigquery incident 18037. <https://status.cloud.google.com/incident/bigquery/18037>, June 2020.
- [28] Google. Google operations incident 19007. <https://status.cloud.google.com/incident/google-stackdriver/19007>, June 2020.
- [29] S. Moon, J. Helt, Y. Yuan, Y. Bieri, S. Banerjee, V. Sekar, W. Wu, M. Yannakakis, and Y. Zhang. Alembic: Automated model inference for stateful network functions. In J. R. Lorch and M. Yu, editors, *16th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2019, Boston, MA, February 26-28, 2019*, pages 699–718. USENIX Association, 2019.
- [30] A. Pavlo, G. Angulo, J. Arulraj, H. Lin, J. Lin, L. Ma, P. Menon, T. C. Mowry, M. Perron, I. Quah, S. Santurkar, A. Tomasic, S. Toor, D. V. Aken, Z. Wang, Y. Wu, R. Xian, and T. Zhang. Self-driving database management systems. In *CIDR 2017, 8th Biennial Conference on Innovative Data Systems Research, Chaminade, CA, USA, January 8-11, 2017, Online Proceedings*. www.cidrdb.org, 2017.
- [31] S. Prabhu, K. Chou, A. Kheradmand, B. Godfrey, and M. Caesar. Plankton: Scalable network configuration verification through model checking. In R. Bhagwan and G. Porter, editors, *17th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2020, Santa Clara, CA, USA, February 25-27, 2020*, pages 953–967. USENIX Association, 2020.
- [32] S. Prabhu, A. Kheradmand, B. Godfrey, and M. Caesar. Predicting network futures with plankton. In K. Chen and J. Padhye, editors, *Proceedings of the First Asia-Pacific Workshop on Networking, APNet 2017, Hong Kong, China, August 3-4, 2017*, pages 92–98. ACM, 2017.
- [33] E. Research. A look at automated fault management with machine learning. <https://www.ericsson.com/en/blog/2019/6/automated-fault-management-machine-learning>, June 2019.
- [34] R. Shambaugh, A. Weiss, and A. Guha. Rehearsal: a configuration verification tool for puppet. In C. Krantz and E. Berger, editors, *Proceedings of the 37th ACM SIGPLAN Conference on Programming Language Design and Implementation, PLDI 2016, Santa Barbara, CA, USA, June 13-17, 2016*, pages 416–430. ACM, 2016.
- [35] S. Smolka, P. Kumar, N. Foster, D. Kozen, and A. Silva. Cantor meets scott: semantic foundations for probabilistic networks. In G. Castagna and A. D. Gordon, editors, *Proceedings of the 44th ACM SIGPLAN Symposium on Principles of Programming Languages, POPL 2017, Paris, France, January 18-20, 2017*, pages 557–571. ACM, 2017.
- [36] K. Subramanian, A. Abhashkumar, L. D'Antoni, and A. Akella. Detecting network load violations for distributed control planes. In A. F. Donaldson and E. Torlak, editors, *Proceedings of the 41st ACM SIGPLAN International Conference on Programming Language Design and Implementation, PLDI 2020, London, UK, June 15-20, 2020*, pages 974–988. ACM, 2020.
- [37] D. Swarm. Docker swarm: Swarm mode overview. <https://docs.docker.com/engine/swarm/>, June 2020.
- [38] Terraform. Terraform: use infrastructure as code to provision and manage any cloud, infrastructure, or service. <https://www.terraform.io/>, June 2020.
- [39] Y. Wu, A. Chen, A. Haeberlen, W. Zhou, and B. T. Loo. Automated bug removal for software-defined networks. In A. Akella and J. Howell, editors, *14th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2017, Boston, MA, USA, March 27-29, 2017*, pages 719–733. USENIX Association, 2017.
- [40] F. Yousefi, A. Abhashkumar, K. Subramanian, K. Hans, S. Ghorbani, and A. Akella. Liveness verification of stateful network functions. In R. Bhagwan and G. Porter, editors, *17th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2020, Santa Clara, CA, USA, February 25-27, 2020*, pages 257–272. USENIX Association, 2020.
- [41] Y. Yuan, S. Moon, S. Uppal, L. Jia, and V. Sekar. Netsmc: A custom symbolic model checker for stateful network verification. In R. Bhagwan and G. Porter, editors, *17th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2020, Santa Clara, CA, USA, February 25-27, 2020*, pages 181–200. USENIX Association, 2020.
- [42] Y. Zhang, W. Wu, S. Banerjee, J. Kang, and M. A. Sánchez. Sla-verifier: Stateful and quantitative verification for service chaining. In *2017 IEEE Conference on Computer Communications, INFOCOM 2017, Atlanta, GA, USA, May 1-4, 2017*, pages 1–9. IEEE, 2017.
- [43] W. Zhou, J. Croft, B. Liu, E. Ang, and M. Caesar. Automatically correcting networks with NEAt. In S. Banerjee and S. Seshan, editors, *15th USENIX Symposium on Networked Systems Design and Implementation, NSDI 2018, Renton, WA, USA, April 9-11, 2018*, pages 595–608. USENIX Association, 2018.