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Rigetti Computing Announces Commercial Availability of 80-Qubit Aspen-M System and Results of CLOPS Speed Tests

BERKELEY, Calif., February 15, 2022 — Rigetti Holdings, Inc. ("Rigetti"), a pioneer in hybrid quantum-classical computing, today announced the commercial availability of its 80-qubit quantum system, Aspen-M. The system is available today to the company's direct and distribution customers through Rigetti Quantum Cloud Services (QCS). Rigetti also reported results of system speed tests run on Aspen-M.

"Last year we introduced the world to our proprietary multi-chip technology. We believe our approach to building quantum computers has tremendous advantages, including allowing us to meet the challenges of scaling to systems capable of solving real-world problems," said Rigetti founder and CEO, Chad Rigetti. "Aspen-M is our first commercial system based on this multi-chip technology. Today, we are excited to make Aspen-M generally available to our customers and to release the initial results of system speed tests run on Aspen-M through our production platform."

Aspen-M System Availability

Aspen-M is now available on Rigetti Quantum Cloud Services and will support a number of Rigetti collaborations taking place with both enterprise and public sector customers including Nasdaq, Deloitte, DARPA and the U.S. Department of Energy. Beginning today, Aspen-M will also be available to end users on Amazon Braket, marking the latest in a series of increasingly powerful Rigetti systems offered through the service since Amazon Braket's launch in 2019. In addition, Rigetti expects the 80-qubit system to be available through Azure Quantum, Strangeworks QC™ and Zapata's Orquestra™ platform in the coming months.

Aspen-M's System Speed Tests

Circuit layer operations per second, or CLOPS, characterizes quantum processing speeds inclusive of gate speeds, reprogrammability, and co-processing capabilities, among other factors. Rigetti has customarily tracked gate speed as a key speed metric. CLOPS is designed to characterize how many circuits can run on a quantum computing system in a given unit of time. It leverages the quantum resources on a device to run a collection of circuits as fast as possible, while stressing all parts of the execution pipeline. CLOPS was initially developed and published by IBM in October 2021.

Rigetti reported today its results based on CLOPS for its most recent 40-qubit system, Aspen-11, and for its 80-qubit Aspen-M system. Conducting tests based on 100 shots, as set forth in the original published definition, the 40-qubit Aspen-11 system demonstrated a CLOPS of 844, while the 80-qubit Aspen-M system demonstrated a CLOPS of 892. These results suggest that current Rigetti systems perform as well or better on this CLOPS speed test as the number of qubits in the system increases. By comparison, IBM's published CLOPS scores for systems with 5, 27, and 65 qubits were 1419, 951, and 753, respectively, as of the October 2021 publishing date.

To reflect what users can potentially expect in typical use cases, Rigetti also evaluated CLOPS using 1000 shots. In this case, Aspen-11 performed at 7512 CLOPS and Aspen-M performed at 8333 CLOPS, demonstrating that comparable or better system speed persists at both higher shot counts and higher qubit counts. These speed tests were conducted using the production Rigetti QCS environment.

CLOPS is calculated as M × K × S × D / time taken where: M = number of templates = 100; K = number of parameter updates = 10; S = number of shots = 100 (or 1000); and D = number of QV layers = log2 QV. To Rigetti's knowledge, CLOPS as a speed test has not been investigated or verified by any independent third party. In addition, while Rigetti applied the above formula in testing the speed of Aspen-M and Aspen-11, there is no guarantee that Rigetti applied the test in the same way as IBM and, as a result, any variability in the application of the test as between Rigetti, IBM or others in the industry that may apply CLOPS in the future could render CLOPS scores incomparable and actual relative performance may materially differ from reported results.

Other than IBM, others in the industry have not announced CLOPS as a speed test. As a result, the speed of other competitors as measured by CLOPS is not currently known. In addition, the solution accuracy provided by quantum computers is another key factor, and a quantum computer that may be slower may be preferable to users if it provides a more accurate answer for certain applications. Moreover, the relative leads reflected by speed tests such as CLOPS can change as new generations of quantum computers are introduced by industry participants and, consequently, any advantages cannot be considered permanent and can be expected to change from time to time. Current CLOPS tests may not be indicative of the results of future tests.

Additional Information and Where to Find It

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considered concerning the proposed business combination and is not intended to form the basis of any investment decision or any other decision in respect of the business combination. Supernova's shareholders and other interested persons are advised to read the definitive proxy statement/prospectus and other documents filed in connection with the proposed business combination, as these materials will contain important information about Rigetti, Supernova and the business combination. The Registration Statement was declared effective by the SEC on February 9, 2022 and the definitive proxy statement/prospectus and other relevant documents were mailed to shareholders of Supernova as of the record date established for voting on the proposed Business Combination and the other proposals regarding the Business Combination. Shareholders are able to obtain copies of the definitive proxy statement and other documents filed with the SEC, without charge, once available, at the SEC's website at www.sec.gov, or by directing a request to Supernova's secretary at 4301 50th Street NW, Suite 300 PMB 1044, Washington, D.C. 20016, (202) 918-7050.

Participants in the Solicitation

Supernova and its directors and executive officers may be deemed participants in the solicitation of proxies from Supernova's shareholders with respect to the proposed business combination. A list of the names of those directors and executive officers and a description of their interests in Supernova is contained in Supernova's definitive proxy statement/prospectus, which was filed with the SEC and is available free of charge at the SEC's website at www.sec.gov. To the extent such holdings of Supernova's securities may have changed since that time, such changes have been or will be reflected on Statements of Change in Ownership on Form 4 filed with the SEC.

Rigetti and its directors and executive officers may also be deemed to be participants in the solicitation of proxies from the shareholders of Supernova in connection with the proposed business combination. A list of the names of such directors and executive officers and information regarding their interests in the proposed business combination is included in the proxy statement/prospectus for the proposed business combination.

No Offer or Solicitation

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Forward-Looking Statements

Certain statements in this communication may be considered forward-looking statements. Forward-looking statements generally relate to future events and can be identified by terminology such as "pro forma", "may", "should", "could", "might", "plan", "possible", "project", "strive", "budget", "forecast", "expect", "intend", "will", "estimate", "anticipate", "believe", "predict", "potential", "goal" or "continue", or the negatives of these terms or variations of them or similar terminology. These forward-looking statements include, but are not limited to, statements

relating to the capabilities of Aspen-M, its future availability, the reliability of the CLOPS test, including potential deficiencies in, or in the application of, the test, customer experience replicating Rigetti's or competitor's test performance, expected collaborations, programs, partnerships and applications, statements with respect to entering into a new era of quantum advantage and ability to advance commercial application of quantum computing, including the ability to scale and encode real-world problems. Such forward-looking statements are subject to risks, uncertainties, and other factors which could cause actual results to differ materially from those expressed or implied by such forward-looking statements. These forward-looking statements are based upon estimates and assumptions that, while considered reasonable by Supernova and its management, and Rigetti and its management, as the case may be, are inherently uncertain. Factors that may cause actual results to differ materially from current expectations include, but are not limited to: the outcome of any legal proceedings that may be instituted against Supernova, Rigetti, the combined company or others following the announcement of the business combination and any definitive agreements with respect thereto; the inability to complete the proposed business combination due to the failure to obtain approval of the shareholders of Supernova or to satisfy other conditions to closing; changes to the proposed structure of the business combination that may be required or appropriate as a result of applicable laws or regulations or as a condition to obtaining regulatory approval of the business combination; the ability to meet stock exchange listing standards following the consummation of the business combination; the risk that the proposed business combination disrupts current plans and operations of Rigetti as a result of the announcement and consummation of the proposed business combination; the ability to recognize the anticipated benefits of the business combination, which may be affected by, among other things, competition, the ability of the combined company to grow and manage growth profitably, maintain relationships with customers and suppliers and retain its management and key employees; costs related to the business combination; changes in applicable laws or regulations; the possibility that Rigetti or the combined company may be adversely affected by other economic, business, or competitive factors; Rigetti's estimates of expenses and profitability; the evolution of the markets in which Rigetti competes; the ability of Rigetti to execute on its technology roadmap; the ability of Rigetti to implement its strategic initiatives, expansion plans and continue to innovate its existing services; the impact of the COVID-19 pandemic on Rigetti's business; and other risks and uncertainties set forth in the sections entitled "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements" in the registration statement on Form S-4 and proxy statement/prospectus discussed above and other documents filed by Supernova from time to time with the SEC.

Nothing in this communication should be regarded as a representation by any person that the forward-looking statements set forth herein will be achieved or that any of the contemplated results of such forward-looking statements will be achieved. You should not place undue reliance on forward-looking statements, which speak only as of the date they are made. Neither Supernova nor Rigetti undertakes any duty to update these forward-looking statements other than as required by law.

The following was posted to the Rigetti Tech Blog on February 15, 2022.

Optimizing full-stack throughput and fidelity with Rigetti's Aspen-M generation of quantum processors

Last year Rigetti announced the industry's first multi-chip quantum processor, based on a modular chip architecture, that helps address the challenge of scaling to systems capable of solving real-world problems. This multi-chip technology is a result of years of innovation in areas such as cross-chip entanglement and 3D signal delivery. Scaling up the qubit count opens the possibility to tackle larger problems, such as being able to use more features with quantum machine learning or a higher number of variables in a combinatorial optimization problem.

Scale is one of the key factors necessary for achieving quantum advantage, which we define as an ability to solve problems of practical relevance in ways that provide benefit over existing classical solutions. These performance benefits could manifest in improved accuracy of results, better time to solution, or lowered cost of operation.

In addition to scale, system speed and fidelity are important performance measures for achieving quantum advantage. Today we're reporting the first system speed and fidelity metrics on Aspen-M-1, our first commercially available 80-qubit system.

System Speed

Superconducting qubit technology, currently used by Rigetti, IBM and Google quantum computers, have gate operations that are generally faster than other commercially available modalities today. While gate speeds are an important factor, there are other aspects of the quantum-classical hybrid system that affect the overall speed at which a solution can be achieved. Recently, IBM introduced CLOPS, or Circuit Layer Operations Per Second, as a measure to characterize this overall system speed, inclusive of gate speeds, reprogrammability, and co-processing capabilities, among other factors.

CLOPS does not measure qubit performance only, but rather assesses the throughput of the entire quantum-classical hardware and software stack by measuring the rate at which a quantum processor can faithfully execute "square" random circuits, where the circuit depth is commensurate with the number of qubits. Random circuits are generated with parameterized rotation angles whose values are specified at runtime and updated on the fly before execution, mimicking the workflow of near-term hybrid quantum-classical algorithms such as VQE or QAOA. From an external user's point of view, CLOPS is a measure that is designed to capture the user's experience implementing and running such near-term algorithms.

The number of qubits targeted by CLOPS is dictated by the processor's quantum volume, and the rate at which circuits can be run is influenced by facets of both the quantum and classical signal chain, such as gate speeds, qubit topology, circuit compilation, and hardware/networking latency. The CLOPS measure is defined as the total number of random circuit layers that can be executed per second of wall clock runtime.

CLOPS is calculated as M x K x S x D / time taken, where M = number of templates; K = number of parameter updates; S = number of shots; and D = number of quantum volume layers, or log2(QV). IBM published a methodology where M = 100; K = 10; S = 100; and D was dependent on the quantum volume of each of three benchmarked systems.

We performed CLOPS measurements with this methodology on our 80QAspen-M-1 and 40Q Aspen-11 QPUs, using the same interface and backend available to users of Rigetti Quantum Cloud Services. When using 100 shots and 3 qubits, we find a CLOPS score of 844 on Aspen-11 and 892 on Aspen-M-1, indicating that our net latency is extremely low.

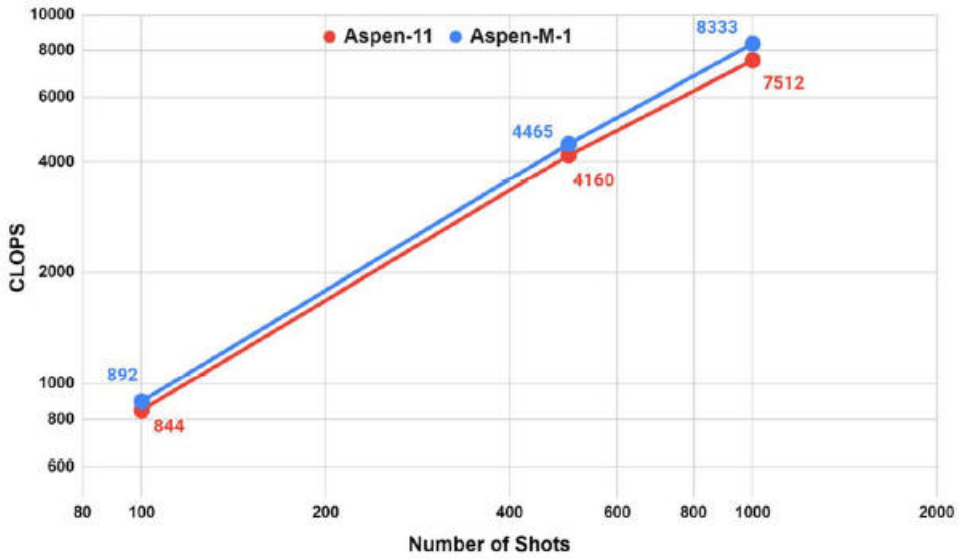

Figure 1

We then calculated CLOPS using 1000 shots (consistent with typical operating conditions of QCS users) and achieved scores as high as 7512 on Aspen-11 and 8333 on Aspen-M-1, demonstrating excellent throughput for tasks requiring higher resolution.Encouragingly, these results reveal little to no dependence on the number of qubits on the QPU, indicating that the current Rigetti QCS platform and our hybrid integration technology delivers comparable or better speed at 80Q scale as at 40Q.

Gate Fidelity

We use the median 2Q entangling gate fidelity over all connected qubits as a way of characterizing the quality of any production system. The median 2Q gate fidelity for the full Aspen-M-1 lattice is 96.5 percent. In addition, Aspen-M provides users with the flexibility to select specific connected lattices on the device with optimized combinations of scale (defined as qubits available on a quantum computing system) and quality (defined as gate fidelity) for their applications. For example, we report multiple 15-qubit connected lattices on Aspen-M that have fidelities above 98%, competitive with commercially available devices of a similar scale. One of the best available 40-qubit sub-lattices on Aspen-M-1 performs with a median 97.8% 2Q gate fidelity, compared with the 96% median fidelity of our 40Q device, Aspen-11.

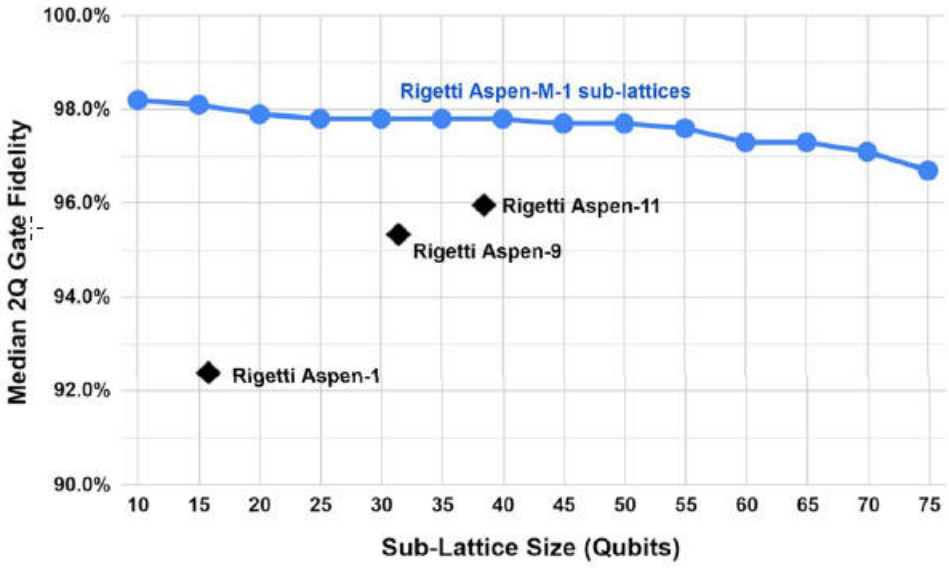

Figure 2

We have steadily improved both the number of qubits and overall system fidelity in our Aspen series of quantum processors since our16-qubit generation, Aspen-1, was released in 2018. Putting these pieces together, we believe Aspen-M can provide the scale, the fidelity, and now the system processing speed, to be a powerful tool for quantum algorithm R&D. Delivering these new capabilities to users around the world helps advance our pursuit of quantum advantage on high-impact problems.

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