

March 5, 2024

Ms. Vanessa A. Countryman
Secretary
Securities and Exchange Commission
100 F Street NE
Washington, DC 20549-1090

Re: 1st CAT Fee Filings (File Nos. SR-BOX-2024-03, SR-CboeBYX-002, SR-CboeBZX-004, SR-C2-2024-002, SR-Cboe-EDGA-2024-002, SR-CboeEDGX-2024-005, SR-CBOE-2024-003, SR-FINRA-2024-002, SR-FINRA-2024-003, SR-IEX-2024-01, SR-LTSE-2024-02, SR-MEMX-2024-01, SR-MIAX-2024-02, SR-EMERALD-2024-01, SR-PEARL-2024-02, SR-PEARL-2024-01, SR-BX-2024-002, SR-GEMX-2024-02, SR-ISE-2024-02, SR-MRX-2024-01, SR-PHLX-2024-01, SR-NYSEAMER-2024-02, SR-NYSEARCA-2024-02, SR-NYSECHX-2024-02, SR-NYSE-2024-03, SR-NYSEAT-2024-01, SR-NASDAQ-2024-001)

Dear Ms. Countryman:

We appreciate the opportunity to provide comments to the Securities and Exchange Commission (the “Commission”) on the recent fee filings (the “1st CAT Fee Filings”) made by each member of the CAT Operating Committee (the “Participants”) purportedly pursuant to 15 U.S.C. § 78s(b)(1) and 17 C.F.R. § 240.19b-4.¹ Those filings, which are similar in all material respects, are the most recent misstep in an effort that has been legally flawed from the beginning.

As Citadel Securities has argued in the U.S. Court of Appeals for the Eleventh Circuit, the Consolidated Audit Trail (“CAT”) to which the filings relate is itself beyond the Commission’s statutory authority to create or direct the Participants to develop. But beyond its lack of legal basis, the CAT’s implementation has been just as flawed. The CAT Operating Committee has made mistake after mistake, wasting resources and missing multiple completion deadlines. And with the CAT’s development and operational costs skyrocketing, the Participants recently proposed a funding model that would permit them to offload virtually all of those costs onto industry firms. The Commission approved that model in an unlawful order (“CAT Funding Order”) riddled with legal problems and plagued with one *non sequitur* after another.² But when Citadel Securities and industry representatives challenged that decision and filed suit in the Eleventh Circuit, the Commission and the Participants decided to join forces: the Commission granted the Participants

¹ 89 Fed. Reg. 11153 (Feb. 13, 2024); 89 Fed. Reg. 11116 (Feb. 13, 2024); 89 Fed. Reg. 11078 (Feb. 13, 2024); 89 Fed. Reg. 11039 (Feb. 13, 2024); 89 Fed. Reg. 11001 (Feb. 13, 2024); 89 Fed. Reg. 10963 (Feb. 13, 2024); 89 Fed. Reg. 10925 (Feb. 13, 2024); 89 Fed. Reg. 10887 (Feb. 13, 2024); 89 Fed. Reg. 10850 (Feb. 13, 2024); 89 Fed. Reg. 10812 (Feb. 13, 2024); 89 Fed. Reg. 10773 (Feb. 13, 2024); 89 Fed. Reg. 10735 (Feb. 13, 2024); 89 Fed. Reg. 10697 (Feb. 13, 2024); 89 Fed. Reg. 10658 (Feb. 13, 2024); 89 Fed. Reg. 10620 (Feb. 13, 2024); 89 Fed. Reg. 10582 (Feb. 13, 2024); 89 Fed. Reg. 10544 (Feb. 13, 2024); 89 Fed. Reg. 10506 (Feb. 13, 2024); 89 Fed. Reg. 10468 (Feb. 13, 2024); 89 Fed. Reg. 10430 (Feb. 13, 2024); 89 Fed. Reg. 10392 (Feb. 13, 2024); 89 Fed. Reg. 10353 (Feb. 13, 2024); 89 Fed. Reg. 10315 (Feb. 13, 2024); 89 Fed. Reg. 10278 (Feb. 13, 2024); 89 Fed. Reg. 10239 (Feb. 13, 2024); 89 Fed. Reg. 10201 (Feb. 13, 2024); 89 Fed. Reg. 10164 (Feb. 13, 2024).

² 88 Fed. Reg. 62628 (Sept. 12, 2023).

unlawful exemptive relief from certain deadlines in exchange for dropping pending litigation against the Commission; the Participants immediately obliged and then intervened to defend the CAT Funding Order they had proposed to the SEC against the industry’s challenge.

Now, with that challenge to the CAT Funding Order still pending, the Participants have taken the concerning step of seeking to impose the first round of costs on the industry. The CAT Funding Order contemplates that the Participants will make at least three sets of filings to offload the costs of CAT’s massive tab to industry firms (“Industry Members”):

Filing	Time Period Covered	Total CAT Fees Borne By Industry Members		
		Directly Assessed (2/3)	May be Passed-Through (1/3)	Total
1	2012 – 2021	\$225 million	\$113 million	\$338 million
2	2022 – mid-2024	~\$357 million	~\$178 million	~\$535 million ³
3	Annual budget (each subsequent year in perpetuity)	More than \$133 million a year	More than \$67 million a year	More than \$200 million a year ⁴

In the 1st CAT Fee Filings, all 25 Participants would direct their members to pay two-thirds of the costs of developing the CAT, just as the CAT Funding Order purports to permit. And just as the CAT Funding Order also permits, one Participant—FINRA—already seeks to pass through its share of the remaining one-third share of historical costs to its members.⁵ Citadel Securities reaffirms its position that the CAT Funding Order is unlawful, and therefore the 1st CAT Fee Filings lack any legal basis. But because the filings are riddled with additional deficiencies, Citadel Securities addresses those here as well.

As an initial matter, it is inappropriate for the Commission to consider the 1st CAT Fee Filings at all at this time. Because the legality of the CAT Funding Order—which authorizes the 1st CAT Fee Filings—is currently under review in the Eleventh Circuit,⁶ the filings are premature. For the reasons given in petitioners’ opening brief in the Eleventh Circuit, there are at minimum grave concerns regarding the legality of the CAT and the CAT Funding Order. The Commission should therefore disapprove the filings and allow the Participants to refile after resolution of the Eleventh Circuit matter (and any related litigation). At the very least, the Commission should extend its own period for decision on the 1st CAT Fee Filings by the full time period allowed by law to allow the Eleventh Circuit further time to consider the issues.

³ According to the 1st CAT Fee Filings, “[t]he total CAT costs for 2022 were approximately \$186 million and the total CAT costs for 2023 are estimated to be approximately \$233 million.” *E.g.*, 89 Fed. Reg. at 10872 n.73. We conservatively estimated costs for the first six months of 2024 by dividing the 2023 operating budget by two.

⁴ Estimated based on the 2023 operating budget. We note the annual operating budget has been significantly increasing in recent years.

⁵ See 89 Fed. Reg. at 11154.

⁶ See *Am. Sec. Ass’n et al. v. SEC*, No. 23-13396 (11th Cir.).

If the Commission nevertheless considers the 1st CAT Filings at this time, it should disapprove them because they are inconsistent with the Exchange Act and the governing regulations for at least three reasons. *See* 15 U.S.C. § 78s(b)(2)(C). *First*, the 1st CAT Fee Filings are unauthorized by the Exchange Act because the CAT Funding Order upon which they rely is unlawful multiple times over. *Second*, the 1st CAT Fee Filings violate the CAT NMS Plan because the Participants have not satisfied a number of the requisite financial accountability milestones. *Third*, the 1st CAT Fee Filings violate both the Exchange Act and the CAT NMS Plan because the fees they seek to impose are not reasonable.

I. The CAT Funding Order Underlying the 1st CAT Fee Filings Is Unlawful.

Citadel Securities has explained in its opening brief in the U.S. Court of Appeals for the Eleventh Circuit how the CAT Funding Order is unlawful on multiple grounds.⁷ *First*, Congress did not expressly authorize the development of a multi-billion dollar surveillance system designed to collect, store, and trace the trading activity and personally identifiable information of every person who transacts on the U.S. equities and options markets.⁸ Given its magnitude, the creation and funding of the CAT is a major question that requires clear congressional authorization. There is none. *Second*, the CAT Funding Order violates the Exchange Act and the Administrative Procedure Act because it fails to reasonably and equitably allocate CAT costs. Although the CAT Order claimed Industry Members would bear “only” two-thirds of the total costs, it then stated the Participants could pass on their one-third share to Industry Members.⁹ A 100% “allocation” is no allocation at all, much less a reasonable and equitable one.¹⁰ *Third*, the Commission arbitrarily approved the Participants’ proposed funding model without conducting the required economic analysis and without considering the CAT’s impact on market efficiency, competition, and capital formation.¹¹

Citadel Securities incorporates by reference the arguments in its Eleventh Circuit opening brief, because the 1st CAT Fee Filings have no legal basis without the challenged CAT Funding Order: if the court vacates it, there will be no Commission-authorized allocation between the Participants and the Industry Members, rendering the Rule 19b-4 filings unsupported. Moreover, that relationship demonstrates that the 1st CAT Fee Filings are premature. While the Participants may be in a rush to impose hundreds of millions in fees on Industry Members before the Eleventh Circuit has a chance to consider the legality of the CAT and the Funding Order, the Commission need not join that effort. The Commission should instead disapprove the 1st CAT Fee Filings and

⁷ Brief of Petitioners, *Am. Sec. Ass’n et al. v. SEC*, No. 23-13396 (11th Cir. Feb. 8, 2024).

⁸ *See id.* at 13–14.

⁹ 88 Fed. Reg. at 62684 n.1135 (“If exchanges passed their CAT fees onto their members in full, the Industry Members would effectively bear 100% of the CAT allocation”); 89 Fed. Reg. at 11159 (“The SEC’s approval order for the CAT Funding Model also recognized that Participants may choose to pass-through their one-third portion of CAT Costs to their members.”); *see also* Brief of Petitioners, *Am. Sec. Ass’n et al. v. SEC*, No. 23-13396, at 33–34.

¹⁰ *See* Brief of Petitioners, *Am. Sec. Ass’n et al. v. SEC*, No. 23-13396, at 32–33 (citing 15 U.S.C. §§ 78o-3(b)(5); 78f(b)(4)).

¹¹ *See id.* at 39–47; Brief for Economists James Overdahl and S.P. Kothari as Amici Curiae Supporting Petitioners, *Am. Sec. Ass’n et al. v. SEC*, No. 23-13396 (11th Cir. Feb. 13, 2024); *see also* 17 C.F.R. § 242.613(a)(5); *see* 88 Fed. Reg. at 62634 n.121.

permit the Participants to re-file them if appropriate after court proceedings have resolved. At the very least, the Commission should exercise the full extent of its statutory authority to delay its decision on the Participants' 1st CAT Fee Filings.¹² Doing so would help protect the Eleventh Circuit's orderly process for reviewing the legality of the CAT Funding Order, which is an issue antecedent to the Rule 19b-4 review process. The Commission should decline the Participants' invitation to make an end-run on the court's review.¹³

II. The Financial Accountability Milestones Are Not Met.

The CAT NMS Plan prohibits the members of the CAT Operating Committee from making a fee filing regarding historical CAT costs “until any applicable Financial Accountability Milestone described in Section 11.6 has been satisfied.”¹⁴ The 1st CAT Fee Filings assert that the Participants have met the Financial Accountability Milestones (“FAMs”) for Periods 1, 2, and 3. That is incorrect for multiple reasons.

First, the Commission has not granted *any* exemptive relief from the requirement to report responses to electronic requests for quotes (“RFQs”) that are not immediately actionable, let alone removed that requirement from the FAMs.¹⁵ Therefore the Commission cannot determine – based on this unmet requirement alone – that the relevant FAMs for any of the periods have been satisfied. Even if the Commission were to belatedly grant exemptive relief for this CAT NMS Plan Requirement (which should have been delivered as early as FAM Period 1), it would not alter the fact that the deadlines to complete the requirements for the relevant FAM Periods have long passed. No exemptive relief was granted for this requirement prior to those deadlines, and therefore no fees can be collected for FAM Periods 1, 2, or 3 under Section 11.6 of the CAT NMS Plan. Furthermore, it is not in the public interest to permit the Participants to allocate hundreds of millions of dollars in historical CAT costs to Industry Members – and thereby borne by investors

¹² See 15 U.S.C. § 78s(b)(2)(B)(ii) (approval or disapproval must occur not later within 180 days, subject to a 60-day extension if the “Commission determines that a longer period is appropriate”).

¹³ The 1st CAT Fee Filings are unlawful for an additional reason stemming from the CAT Funding Order: they are plan amendments that must proceed through the normal requirements of NMS Rule 608, not Rule 19b-4. In 2020, the Commission amended NMS Rule 608 to specifically remove the effective-upon-filing exception for “NMS plan fee amendments.” 85 Fed. Reg. 65470 (Oct. 15, 2020). Such amendments must now undergo the typical Rule 608 review process, with “opportunity for public comment and Commission approval.” *Id.* at 65471. The 1st CAT Fee Filings make clear that they would establish *NMS plan fees* rather than a typical fee set by an individual exchange for its members. In particular, the entity controlling *the CAT NMS Plan* (“Consolidated Audit Trail, LLC” or “CAT LLC”)—not individual Participants—is the one who will administer the proposed fees: Consolidated Audit Trail, LLC will (a) determine the specific fee amounts payable by particular Industry Members, (b) provide those Industry Members with invoices, (c) receive payment, notably, through a centralized CAT portal, and (d) notify the industry when the full amounts have been paid. *See, e.g.*, 88 Fed. Reg. at 10873–74. Those features render the charges “NMS plan fees” under any reasonable definition, which is likely why the Commission specifically and repeatedly referenced the CAT NMS Plan when amending Rule 608 and identified it as a key reason to prohibit immediately effective NMS plan fee filings. *See id.* at 65471, 65481, 65482.

¹⁴ Section 11.3(b)(iii)(B)(III) of the CAT NMS Plan.

¹⁵ Letter from the CAT Operating Committee (May 23, 2023), available at: <https://www.catnmsplan.com/sites/default/files/2023-05/05.23.23-Exemption-Request-Regarding-Responses-to-Electronic-RFQs.pdf>.

– when it is the Participants who have failed to comply with the requirements of the CAT NMS Plan as interpreted by the Commission.¹⁶

Second, while the Commission has granted the Participants temporary exemptive relief from another CAT NMS Plan requirement (verbal floor activities and upstairs activity),¹⁷ it has not removed that requirement from the FAMS. Nor has the Commission provided that the requirement will somehow be deemed removed upon the Participants’ fulfillment of the conditions of the exemption. Nor could it since the temporary exemption still requires full compliance by July 31, 2026 and also requires the Participants to provide a detailed status update to the Commission by July 31, 2025.¹⁸ Unless the Participants *already* have achieved full compliance with the original requirement and have provided the necessary status update—and there is no indication that they have—it is impossible to determine that they have fulfilled the terms of the exemption. Perhaps for that reason, the 1st CAT Fee Filings do not discuss how they have complied with either the original requirement or the conditions of the temporary exemptive relief. The Commission therefore cannot determine that FAMS for the relevant periods have been satisfied.

Third, the CAT Operating Committee has yet to complete numerous other requirements that were supposed to be delivered during FAM Periods 1, 2, or 3. These include:

Lifecycle linkage timeframes ¹⁹
Re-processing corrected data received after T+5 ²⁰
Linkage requirements for SIP data ²¹
Reporting requirements for port-level settings ²²
Lifecycle linkages between customer orders and representative orders ²³
Participant reporting of rejected orders ²⁴
Online targeted query tool ²⁵

¹⁶ See *Cboe Futures Exchange v. SEC*, 77 F.4th 971, 980 (D.C. Cir. 2023). When adopting the Financial Accountability Milestones, the Commission stated that these provisions “would not allow further delays to occur without consequences.” 85 Fed. Reg. 31322, 31335 (May 22, 2020), available at: <https://www.govinfo.gov/content/pkg/FR-2020-05-22/pdf/2020-10963.pdf>.

¹⁷ Release No. 34-98023 (July 28, 2023), available at: <https://www.sec.gov/files/rules/exorders/2023/34-98023.pdf> (order extending temporary exemptive relief); 85 Fed. Reg. 73544 (Nov. 18, 2020) (order granting temporary exemptive relief).

¹⁸ Release No. 34-98023, at 8.

¹⁹ Release No. 34-97530 (May 19, 2023), available at: <https://www.sec.gov/files/rules/exorders/2023/34-97530.pdf>; 87 Fed. Reg. 42247 (July 8, 2022).

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

The Commission has granted time-limited exemptive relief from these requirements. However, when granting this exemptive relief, the Commission specifically stated that it “ma[de] no determinations” regarding whether the Participants have complied with specific FAMs, and that “it [was] most appropriate to consider whether the Participants have met the target deadlines established for each Financial Accountability Milestone *in connection with proposals related to the imposition of CAT fees on broker-dealers.*”²⁶ Therefore, the exemptive relief did not attempt to automatically deem the Participants to have satisfied the FAMs even though they failed to deliver key requirements of the CAT NMS Plan. The Commission was instead clear that it was deferring any such determination and would make it in connection with subsequent fee filings made by the Participants (i.e., the 1st CAT Fee Filings currently before the Commission).

However, as part of an extraordinary effort to resolve ongoing litigation with the Participants over the scope of the CAT NMS Plan and enlist the Participants’ support in the Eleventh Circuit, the Commission suddenly reversed course in November 2023.²⁷ In a new exemptive order, the Commission made two novel claims: (1) that “to the extent that the Participants are availing themselves of exemptive relief from a CAT NMS Plan requirement, such requirement shall not be included in the requirements for a FAM, provided that the conditions of the exemption are satisfied”²⁸ and (2) that the Commission determined that the Participants had complied with the conditions of the prior exemptive relief “including for purposes of determining compliance with any applicable Financial Accountability Milestones,” meaning that the failure to deliver these elements of the CAT NMS Plan would have no bearing on whether the Participants satisfied FAM Periods 1, 2, and 3.²⁹

Together, these decisions represent arbitrary and capricious Commission action. The novel position that failing to deliver a core CAT NMS Plan requirement is automatically irrelevant for purposes of the FAMs (as long as exemptive relief is obtained after the fact and any conditions therein are complied with) contradicts Commission rulemaking establishing the FAMs,³⁰ and the express terms of the initial exemptive relief, which expressly left such determinations to the subsequent fee filings made by the Participants.³¹ The Commission did not acknowledge or reasonably explain its abrupt about-face, nor could it. Rather than reasoned decisionmaking, it

²⁶ Release No. 34-97530 n.24 (emphasis added).

²⁷ 88 Fed. Reg. 77128, 77129 (Nov. 8, 2023) (“November 2023 Exemptive Order”) (“In connection with the parties’ settlement of the pending litigation, the Commission has determined to issue a new order granting the Participants conditional exemptive relief from certain requirements of the CAT NMS Plan [. . .] This relief is to take effect upon issuance of an order by the D.C. Circuit dismissing with prejudice the Participants’ petition for review of the 2022 Order.”).

²⁸ *Id.* at 77129 n.13.

²⁹ *Id.*

³⁰ 85 Fed. Reg. at 31348.

³¹ The Commission points to an obscure footnote in separate exemptive relief granted for a completely unrelated CAT matter to support its contention that granting exemptive relief automatically means that a CAT NMS Plan requirement is excluded for purposes of the Financial Accountability Milestones. But all this shows is that the Commission expressly *chose not to make such an assertion* in the exemptive relief initially granted for these CAT NMS Plan requirements. See 85 Fed. Reg. 36631, 36633 n.39 (June 11, 2020).

appears that these pronouncements were the product of an unprecedented effort by the Commission to resolve litigation with the Participants so that they could intervene in petitioners' recently filed Eleventh Circuit suit and present a united front in defending the Funding Order.³²

The November 2023 Exemptive Order is also incoherent. It determined that exemptive relief will effectively remove requirements from the FAMs, “provided that the conditions of the exemption are satisfied.”³³ But many of the conditions of the exemptive relief addressed in the Order require actions *in the future*. For example, Parts II.C and II.G of the Order require the Participants to adopt specific functionalities by way of a change order and then fully implement those functionalities within twelve months thereafter.³⁴ And one of the forms of exemptive relief is itself temporary: the requirements for lifecycle linkages between customer orders and representative orders must still be completed by January 31, 2025.³⁵ It therefore was (and still is) impossible for the Commission to determine whether “the conditions of the exemption are satisfied” for each of these requirements, as the November 2023 Exemptive Order itself requires.

Finally, neither the initial exemptive relief nor the November 2023 Exemptive Order contain the necessary analysis to support a determination by the Commission that these core CAT NMS Plan requirements should not be included for purposes of the FAMs. In particular, the Commission would need to conclude that it is in the public interest to permit the members of the CAT Operating Committee to allocate hundreds of millions of historical costs to investors even though they have failed to comply with a multitude of CAT NMS Plan requirements resulting in delays that have directly increased CAT-related implementation costs for Industry Members.³⁶ No attempt was made to consider the interests of Industry Members, who are directly impacted by any Commission action that results in specific CAT NMS Plan requirements being excluded from the FAMs or that otherwise impacts how the FAMs are interpreted.³⁷ As a result, the novel assertions made by the Commission in the November 2023 Exemptive Order are unlawful and therefore are irrelevant.

According to the Financial Accountability Milestones set forth in Section 11.6 of the CAT NMS Plan, it is clear that the members of the CAT Operating Committee have not satisfied the FAMs for Periods 1, 2, or 3 given the undelivered requirements detailed above. As a result, the Fee Filings must be rejected as inconsistent with the current CAT NMS Plan.³⁸

³² Highlighting the extraordinary nature of the settlement, the November 2023 Exemptive Order noted that if “the Participants file a petition for review of this Order, the relief granted herein will be rescinded by its own terms and the 2022 Order and the 2023 Order will resume governing.” 88 Fed. Reg. at 77129.

³³ *Id.* at 77129 n.13.

³⁴ *Id.* at 77131–32.

³⁵ *Id.* at 77132.

³⁶ See *Choe Futures Exchange*, 77 F.4th at 980. The Commission must also undertake the same analysis when considering whether to grant the CAT Operating Committee exemptive relief from FAM Period 4. See CAT Exemptive Request (May 22, 2023), available at: <https://catnmsplan.com/sites/default/files/2023-06/05.22.23-Exemption-Request-Regarding-FAM-4.pdf>

³⁷ We note that, by proceeding through exemptive action, the Commission did not even provide Industry Members with public notice or an opportunity to comment before taking this action.

³⁸ See *Simmons*, 782 F.2d at 1550 (“The courts must overturn agency actions which do not scrupulously follow the regulations and procedures promulgated by the agency itself.”).

III. The Costs in the 1st CAT Fee Filings Are Not Reasonable.

The Exchange Act and the CAT NMS Plan each require that any fees imposed on Industry Members must be reasonable.³⁹ As detailed in 2019 staff guidance,⁴⁰ the Commission must carefully scrutinize fee filings from exchanges and FINRA to ensure that those fee filings are consistent with the Exchange Act. The 1st CAT Fee Filings include a number of unreasonable costs “that were incurred due to Participant mismanagement, costs that were inflated or costs that should reasonably be allocated to only the Participants,”⁴¹ and do not provide the information necessary to assess overall reasonableness. For example:

- It is not reasonable for Industry Members to bear any costs incurred before Q2 2019 when Thesys was the Plan Processor. The ill-fated decision by the Participants to engage Thesys resulted in significant implementation delays and cost overruns, including with respect to Industry Member implementation costs. While certain costs are excluded from this period, the 1st CAT Fee Filings seek to allocate significant costs relating to the Thesys engagement, including for technology that may not have been utilized by the current Plan Processor and a “Transition Fee” that is not described at all.⁴²
- It is not reasonable for Industry Members to bear costs that were not incurred by the CAT Operating Committee, and instead relate to payments made by individual exchanges.⁴³ At the very least, the filings contain inadequate information to assess the reasonableness of these costs.
- It is not reasonable for Industry Members to bear costs related to the multi-year litigation between the CAT Operating Committee and the Commission.⁴⁴ The costs of the Participants’ disagreements with the SEC over what the CAT NMS Plan *requires* are not costs of *implementing* those requirements. Industry Members should not have to foot the bill for the Participants’ own litigation choices.
- It is not reasonable for Industry Members to bear costs related to the CAT Operating Committee’s insistence on including unlawful limitation of liability provisions in the CAT Reporter Agreement, which were contrary to the interests of Industry Members and ultimately rejected.⁴⁵ Costs attributable to *rejected* aspects of CAT’s implementation

³⁹ 15 U.S.C. §§ 78o-3(b)(5), 78f(b)(4); *see* section 11.3(b)(iii)(B)(II) of the CAT NMS Plan.

⁴⁰ Staff Guidance on SRO Rule Filings Relating to Fees (May 2019), available at: <https://www.sec.gov/tm/staff-guidance-sro-rule-filings-fees>.

⁴¹ 88 Fed. Reg. at 62657.

⁴² *See, e.g.*, 89 Fed. Reg. at 10856.

⁴³ *See, e.g., id.* at 10857–59.

⁴⁴ *See, e.g., id.* at 10869.

⁴⁵ *See, e.g., id.* at 10857, 10862, 10869.

should not fall on Industry Members any more than the costs attributable to the Thesys failure.

- It is not reasonable for Industry Members to bear costs related to the repeated filing of funding models that were not consistent with the Exchange Act and were subsequently withdrawn.⁴⁶ Again, the costs of failed aspects of CAT’s implementation should fall on the parties responsible for those failures.
- It is not reasonable for Industry Members to bear millions in costs relating to the Customer & Account Information System (CAIS), including for a vendor that has since been terminated in light of implementation delays and cost overruns, particularly before separate fee filings are made for FAM Period 4.⁴⁷
- It is not reasonable for Industry Members to bear costs relating to public relations firms “monitoring comments made by market participants about CAT.”⁴⁸ The CAT NMS Plan did not order the Participants to expend resources to keep an eye on their own reputations. Their choice to do so was their own, and the costs should be as well.

In addition to the items above, far more detail must be provided regarding technology costs, and in particular the costs relating to cloud hosting services. Cloud hosting services represent the largest line item in the CAT operating budget, accounting for more than \$125 million in the 1st CAT Fee Filings alone. In order to determine whether these costs are reasonable, it is critical to understand how the CAT system was designed, what the key cost drivers are, and whether all reasonable cost efficiencies were pursued.

The CAT Operating Committee has repeatedly refused to provide sufficient detail regarding the technical design of the CAT system or the costs incurred to design and maintain it.⁴⁹ That trend continues in the 1st CAT Fee Filings. Despite their length, the 1st CAT Fee Filings continue to obscure the specific costs of the CAT’s technological infrastructure and instead merely assert that the number of CAT records has increased by “five times that original estimate” and “[t]he cost for AWS services for the CAT is a function of the volume of CAT Data. The greater the amount of CAT Data, the greater the cost.”⁵⁰ However, this leaves the most basic of questions unanswered, such as *why* has the number of CAT records increased by five times, even though overall market trading volume has not. Furthermore, the CAT Operating Committee does not explain *how* overall technology cost is correlated to the number of CAT records, and, if these are highly correlated, why it is reasonable to assign Industry Members up to 100% of CAT costs when the SROs appear to be responsible for more than 90% of the total CAT records per the data provided in the filings.

The absence of requisite detail in the 1st CAT Fee Filings is underscored by a recent presentation by FINRA CAT and Amazon Web Services (“AWS”) clearly demonstrating that the

⁴⁶ See, e.g., *id.* at 10857–58.

⁴⁷ See, e.g., *id.* at 10855.

⁴⁸ See, e.g., *id.* at 10859.

⁴⁹ See, e.g., 88 Fed. Reg. 17086 (Mar. 21, 2023).

⁵⁰ E.g., 89 Fed. Reg. at 10854.

CAT Operating Committee and the Participants have the granular details regarding the CAT's technological design and associated costs at their fingertips, yet refuse to share that information in the filings.⁵¹ In order to establish that the technology costs are reasonable, however, the Participants must provide both the technical information regarding the CAT's design and detailed cost allocations, including the design alternatives considered to address identified issues. Below, we include a non-exhaustive list of relevant considerations that flow from the FINRA CAT/AWS presentation which the Participants must analyze, and the Commission must review, before approving the 1st CAT Fee Filings.

General Issues the Commission Must Consider in Analyzing the Reasonableness of Technological Costs

- CAT LLC selected AWS as its primary data processor, but the Participants have not explained the process by which AWS was selected or the alternative vendors considered. Without this information the Commission and market participants cannot assess whether CAT LLC and the Participants' selection of AWS was a reasonable, cost-efficient decision.
 - Regarding CAT LLC's selection of AWS, the Participants must provide the key deal structure terms (e.g., any multi-year commitment), including information about any discounts received from AWS.
 - The Participants must also provide information sufficient for the Commission to assess whether the AWS agreement is competitive as compared to similar contracts for cloud-hosting services of similar data sets.
 - CAT technology costs continue to increase even as the costs of data management systems generally continue to steadily decline. The Participants must therefore provide information about the horizon for the contract renegotiation with AWS and whether CAT LLC plans to seek discounts from AWS or to pivot to a different vendor whose costs track global trends.
 - CAT LLC must also provide an estimate of the costs to switch vendors at this stage.
- In designing the CAT system, the Participants must explain the technological and architectural alternatives they considered before pursuing the current system.⁵² The Participants must also explain how the design choices were affected by Thesys's failed implementation efforts.
 - To provide the sufficient comparative analysis necessary to assess the reasonableness of the CAT LLC costs, the Participants must confirm whether CAT

⁵¹ See AWS re:Invent 2022 – Scaling data processing w/ Amazon EMR at the speed of market volatility (ANT338), YOUTUBE (Dec. 2, 2022), available at: <https://www.youtube.com/watch?v=g2r2-q6DpyM> (excerpts from this presentation are attached as Exhibit A ("Ex. A")).

⁵² For example, when designing OATS, FINRA notes that "[t]o arrive at the right solution to host OATS, FINRA needed to perform an in-depth comparison of potential architectures. Three proofs of concept were built to test various options." See FINRA Adopts AWS to Perform 500 Billion Validation Checks Daily, Amazon Web Services, available at: <https://aws.amazon.com/solutions/case-studies/finra-data-validation/>.

LLC has engaged an external auditor to review the CAT LLC architecture and state of optimization (e.g., a firm that only is paid based on savings realized).

- The Participants must also confirm which competitive vendors (e.g., Google, Azure) have provided a competitive analysis of the technological solution/key service costs.
- As to the operation of the system, the Participants must describe the key performance indicators (“KPIs”) used to measure and track efficiency (e.g., linkage cost per record, CPU utilization). The Participants must also explain whether and how these KPIs have evolved over time.
 - Given that technology costs have continued to decrease in general market-wide (outside of CAT), the Participants must provide a description of how the CAT’s core KPIs have trended relative to this market-wide decline in technological costs.

The Technological Costs

- The AWS system designed to capture and consolidate CAT data is divided into three primary categories: (1) compute; (2) storage; and (3) managed services.⁵³ The Participants must offer a percentage breakdown of how costs are divided among these three categories.
 - The Participants should also detail the amount of data stored in the Amazon Simple Storage Service (S3), and describe how data is allocated among various classes of storage (e.g., regular vs. glacier).⁵⁴
 - For S3 storage usage, the Participants should detail the storage formats and compression algorithms used for any data set that is greater than 10% of the total.⁵⁵ The Participants should also detail the process used to select the storage formats and compression algorithms and how they have been optimized.⁵⁶
 - Moreover, beyond the costs of computation and storage, the Participants should offer an itemized budget detailing technology costs that exceed 5% of the total technology budget.⁵⁷
- In percentage terms, the Participants should detail the division of costs among the three primary stages of process flow, i.e., (1) Collection/validation, (2) Process (linkage validation, assembling lifecycle, enrichment), and (3) Dissemination.⁵⁸

⁵³ See, e.g., Ex. A, slide 1.

⁵⁴ See Ex. A, slide 1.

⁵⁵ See *id.*

⁵⁶ See *id.*

⁵⁷ See *id.*

⁵⁸ See *id.*

- With respect to the costs allocated to the “Process” stage, the Participants should detail how costs are they divided among (1) Linkage validation, (2) Assembling lifecycle, and (3) Enrichment (in percentage terms).⁵⁹
 - With respect to the costs allocated to “Linkage validation,” the Participants should delineate in percentages the division of costs between *intra*-firm and *inter*-firm linkages.⁶⁰
- In order to meet the T+1 12:00 pm processing deadline, CAT is now processing files in three batches – at 12:00 am, 4:00 am, and 8:00 am. The Participants should detail the incremental cost of running three daily batches instead of one.⁶¹
- Data linkage is a core problem; yet a relatively generic open-source tool (i.e., Spark) is being used which is cited as having numerous bugs/performance challenges that are now contributing to the dramatic cost increases.⁶²
 - Spark may not be fit for purpose. The Participants should explain why they have not designed a tailored solution specifically for linkages. The Participants should also detail the different solutions that have been considered to address the inefficiencies related to this critical task.⁶³
 - The Participants should detail any consideration given to design changes (e.g., how IDs are represented in records) that would solve the data-linkage issue more easily from a computational perspective.⁶⁴
 - The Participants should detail the major inputs for the linkage costs, including whether costs scale linearly as a function of total records.⁶⁵
 - The Participants should provide the metrics used to measure overall cost efficiency.⁶⁶
- The Participants should detail how quickly AWS Graviton was adopted for the CAT program, and the incremental cost (or cost savings) of using Graviton.⁶⁷

⁵⁹ See *id.*

⁶⁰ See *id.*

⁶¹ See *id.*, slide 2.

⁶² See *id.*, slides 3–7.

⁶³ See *id.*, slides 4–6.

⁶⁴ See *id.*, slides 3–7.

⁶⁵ See *id.*

⁶⁶ See *id.*

⁶⁷ See *id.*, slides 5–7.

- The Participants should explain whether the 60% cost reduction for linkages applies to both *intra-firm* and *inter-firm* linkages.⁶⁸ Further, the Participants must explain why the 60% cost reduction for linkages has not corresponded to a proportional reduction in the overall CAT costs.⁶⁹
- AWS uses the prefix of the file to scale efficiently, but the Participants have not explained why the current approach with respect to prefixes was chosen, as it appears to result in a non-scalable solution that then requires workarounds. The Participants must also detail whether other more efficient alternatives were considered.⁷⁰
- The Participants should offer a detailed description of the percentage of virtual machines that use OnDemand Capacity reservations vs. spot, along with a comparison detailing the incremental cost of using OnDemand Capacity as opposed to spot systems.⁷¹
- AWS recognizes that bad nodes cause slow-downs and affect the data processing capacity, yet the Participants do not detail whether the observed level of bad nodes was anticipated nor the incremental cost to address the bad nodes.⁷² This information must be provided, along with information about whether vendor credits or other discounts are provided for the additional costs accrued due to hardware issues.⁷³
- AWS offers a chart explaining that “core linker jobs have reduced by more than 50%” after various process optimization efforts implemented over an eight-month period.”⁷⁴ Yet there does not appear to be a corresponding decline in the overall CAT technology budget. The Participants must explain this discrepancy.
- AWS provided a chart offering “[s]uccess metrics” for achieving SLA.⁷⁵ But similar metrics were not provided for the time period before 2022.⁷⁶ The Participants should offer the pre-2022 metrics (given the time period covered by these filings) and describe the financial consequences that may flow for failure to meet the SLA.

In short, the 1st CAT Fee Filings contain numerous costs that are clearly unreasonable to impose on Industry Members, and a whole host of costs for which the Commission cannot assess reasonableness due to the inadequate information provided by the Participants. The Commission should disapprove these costs.

⁶⁸ See *id.*, slide 7.

⁶⁹ See *id.*

⁷⁰ See *id.*, slide 8.

⁷¹ See *id.*, slide 9.

⁷² See *id.*, slide 10.

⁷³ See *id.*

⁷⁴ *Id.*, slide 11.

⁷⁵ *Id.*, slide 12.

⁷⁶ See *id.*

* * * * *

We thank the Commission for considering our comments. For all of the reasons set forth above, particularly in light of the pending challenge to the CAT Funding Order in the Eleventh Circuit, the Commission should, at the very least, extend its deadline for assessing the 1st CAT Fee Filings, and ultimately disapprove all of them.

Please feel free to call the undersigned with any questions regarding these comments.

Respectfully,

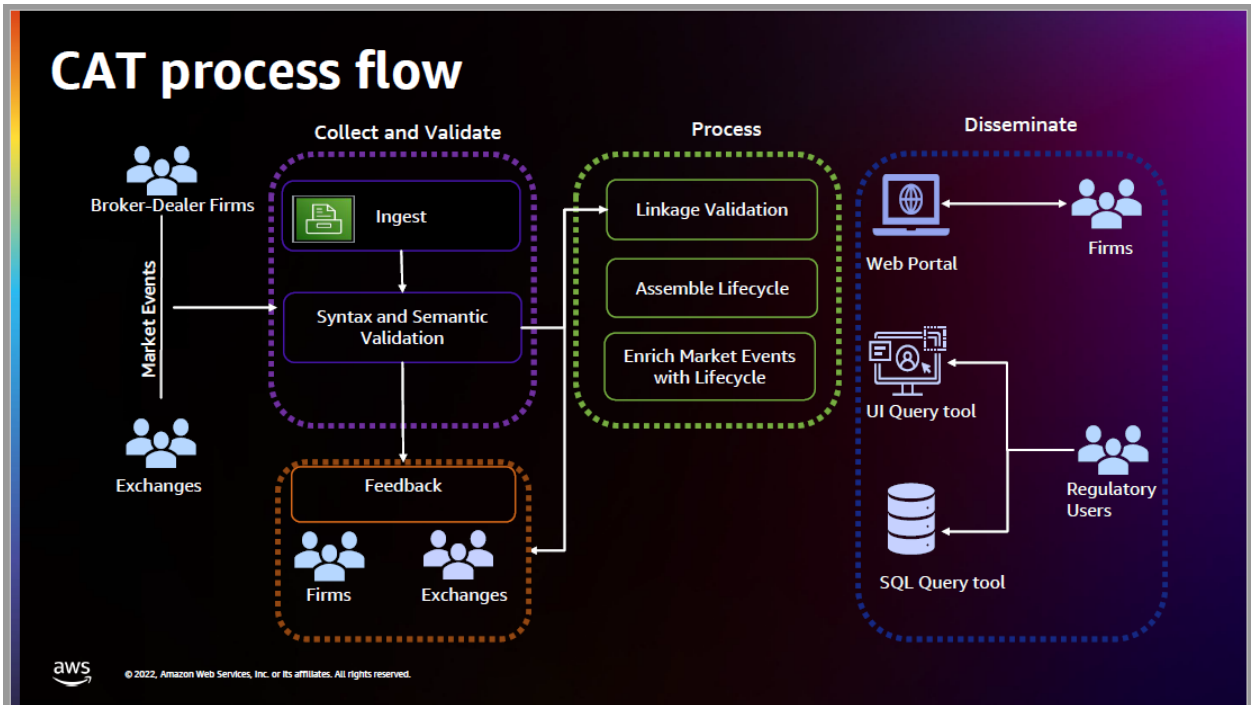
/s/ Stephen John Berger

Managing Director

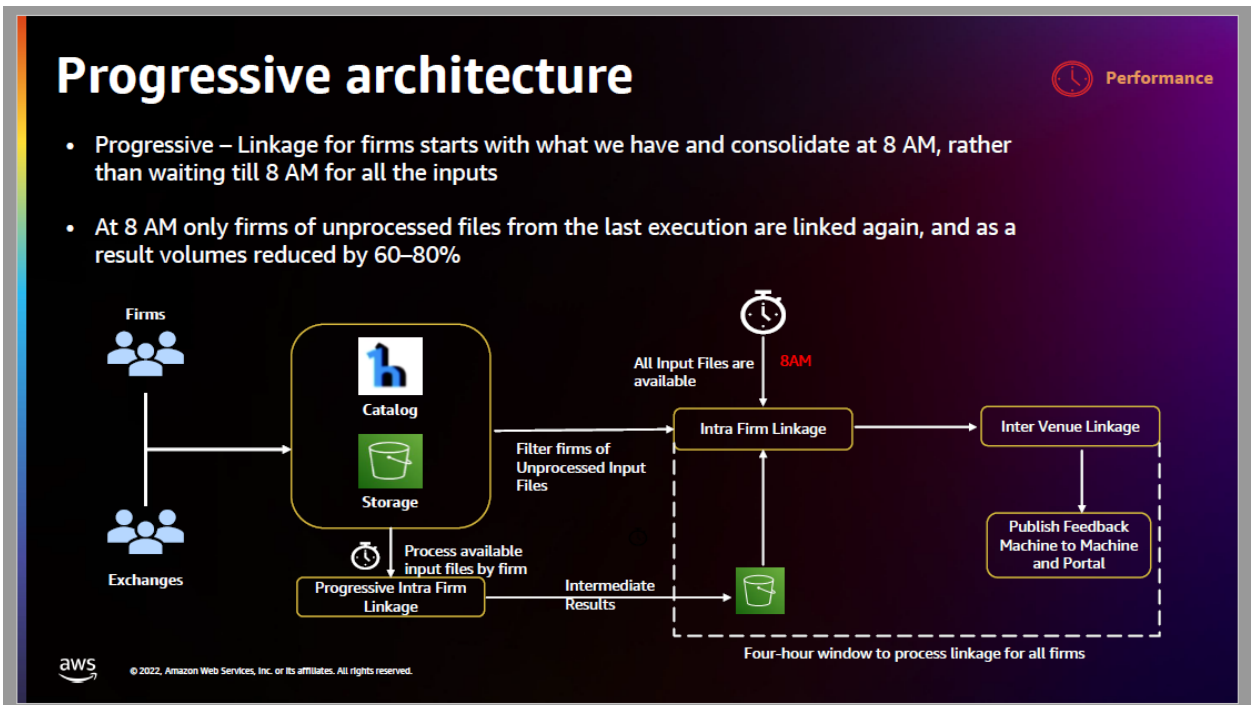
Global Head of Government & Regulatory Policy

Exhibit A

Slide 1.



Slide 2.



Slide 3.

CAT application challenge

Performance

APACHE SPARK SHUFFLE LIMITATION

- Linkage Validation requires grouping by multiple keys
- Any group by operation will trigger a data shuffle greater than 100 TB
- Shuffle is very heavy IO as it uses local disk for reading and writing shuffle files
- With IO intensive shuffles Amazon EBS GP2 IOPS was saturated with large clusters

The diagram illustrates the data shuffle process in Apache Spark. At the top, two 'Executor' boxes, each containing a 'Mapper', are shown. Arrows labeled 'Generate Shuffle Files' point from these executors to a central 'Local Dir Shuffle Files' box. From this box, an arrow points down to an 'External Shuffle Service' box. Below this, three 'Executor' boxes, each containing a 'Reducer', are shown. Arrows labeled 'Read Shuffle Blocks' point from the 'External Shuffle Service' box to each of the three 'Reducer' executors.

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Slide 4.

Performance impact of Apache Spark version

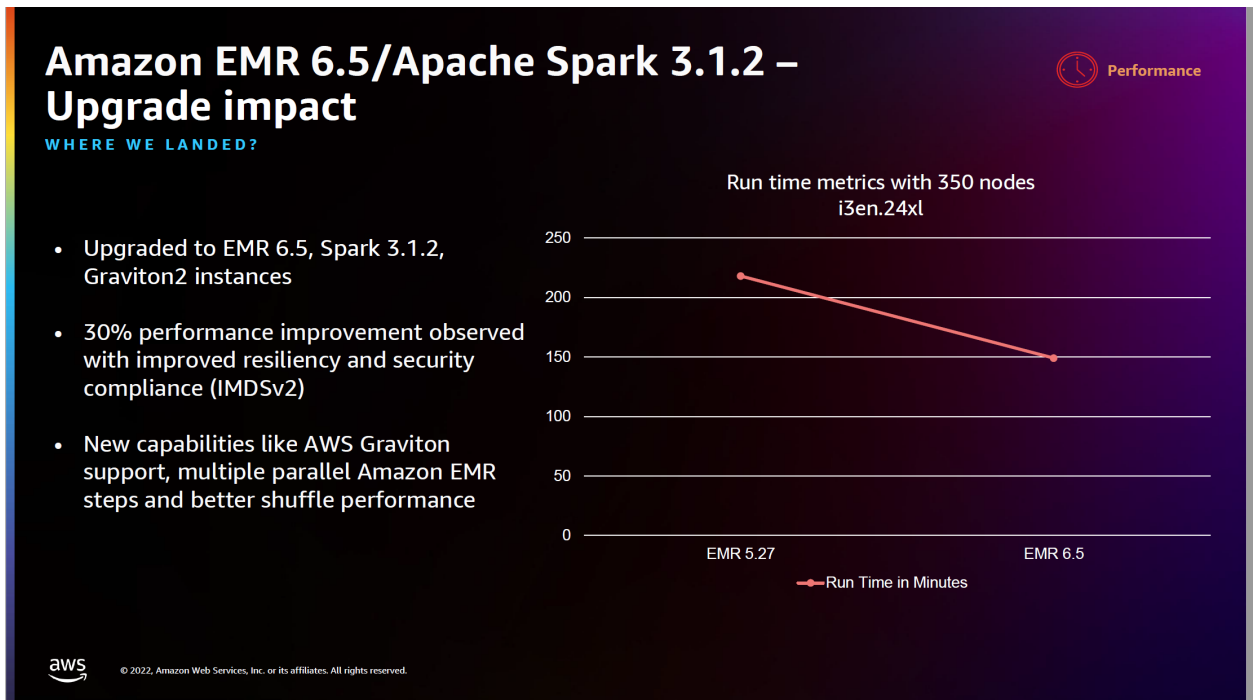
Performance

WHERE WERE WE?

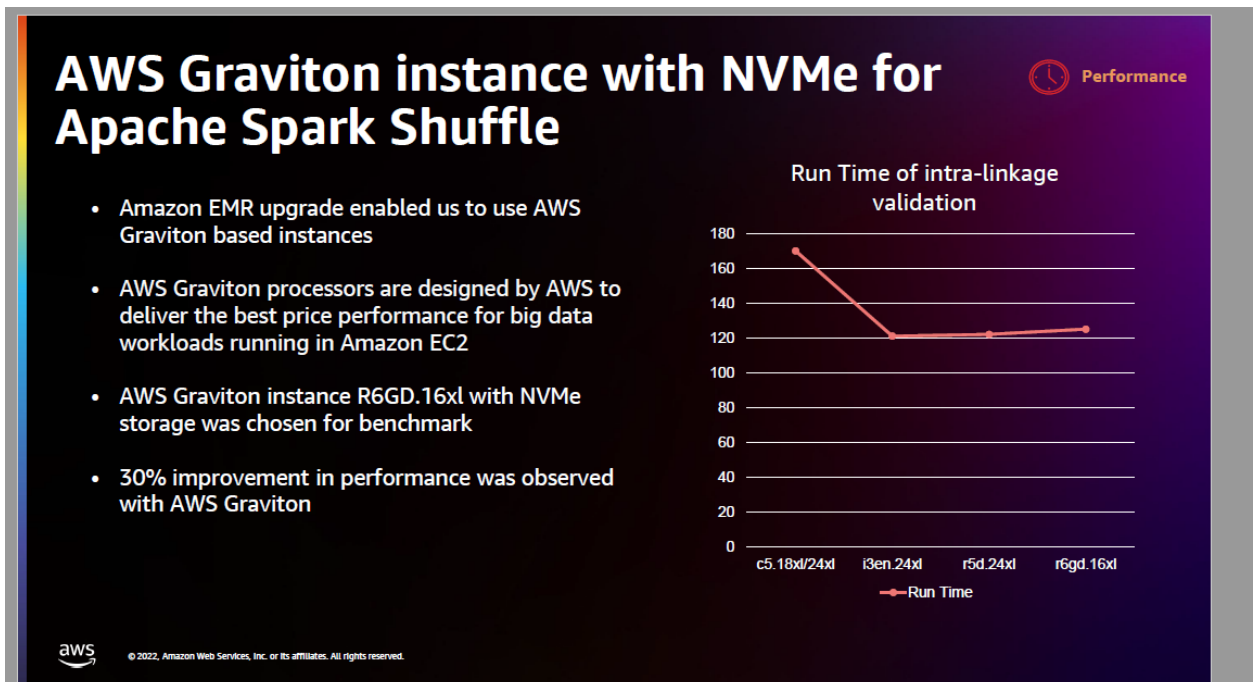
- Workloads were running on clusters of size ranging from few nodes to 1800 nodes with Amazon EMR 5.27-5.29/Apache Spark 2.4
- C5.18xlarge and C5.24xlarge were the most used instance types
- Performance impacted by job resiliency as a result of open-source bugs and large clusters

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Slide 5.




Slide 6.



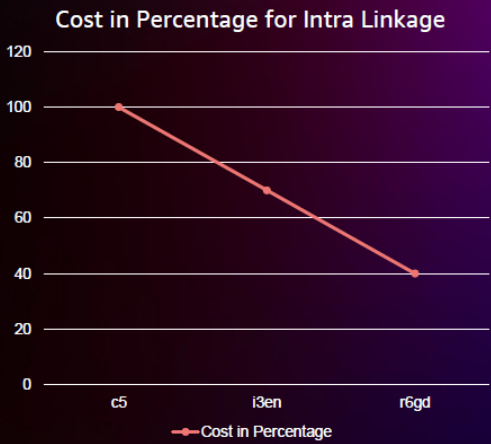
Slide 7.

AWS Graviton adaption for cost optimization


 Cost

- With the use of the Graviton instance type, the compute instance hours have reduced significantly
- 60% better price performance was observed on Graviton instance R6GD.16xl with NVMe storage

Cost in Percentage for Intra Linkage





Instance Type	Cost in Percentage
c5	100
i3en	70
r6gd	40

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Slide 8.

Handling burst of reads/writes in an Amazon S3 partition

 Scalability

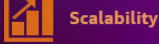


- Amazon S3 – 3,500 put/5,500 get requests per second per prefix
- FINRA's Amazon S3 prefixes are partitioned by trade date and will look like this
`s3:<bucket>/cat/processing_date=mmdyyy/brokerevents/brokerid=abcd/`
- Folders inside the trade date prefix will need high throughput due to traffic burst generated by multiple workloads running on Amazon EMR
- Amazon S3 traffic heat generated at processing date level due to multiple parallel jobs reading and writing to the same date level partition
- Jobs impacted with 503 (s3 slow down) errors which causes jobs to fail

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Slide 9.

Targeted/suspendable ODCR to guarantee capacity




CAT Needs Capacity Guarantee

- CAT needs to complete processing the markets events in the four-hour window to provide feedback to the firms and exchanges
- To meet the processing deadlines, guaranteed capacity is very important.
- No insufficient capacity exceptions (ICE) when provisioning

On-Demand Capacity Reservations

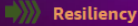
- CAT mission critical application relies on OnDemand Capacity reservations to reduce the impact of ICE
- Targeted on demand reservations are used to target the reservations against specific workflows by specifying the reservations on the Amazon EMR cluster definition
- Reservations are suspended over the weekends to reduce cost and resumed when the processing starts



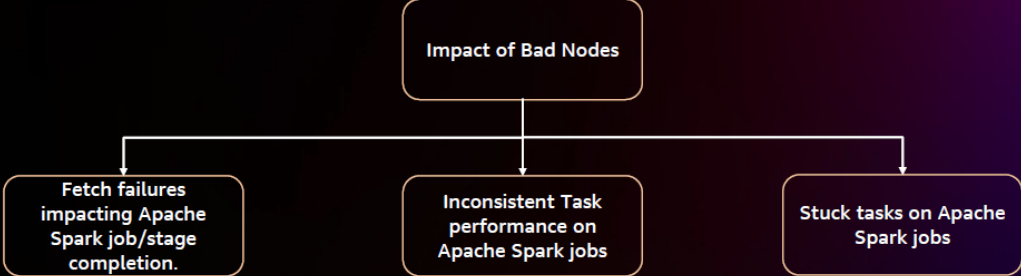
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Slide 10.


SLA Impact of bad nodes in the Cluster



- ~300k compute nodes daily – At some point we will land on every server in an Availability Zone
- Common to land on hardware with known/unknown issues [Memory Errors/CPU]
- Even with Amazon EMR and Apache Spark has built in fault tolerance, processing was impacted by 15–20 mins due to task retries, slow running or straggler task

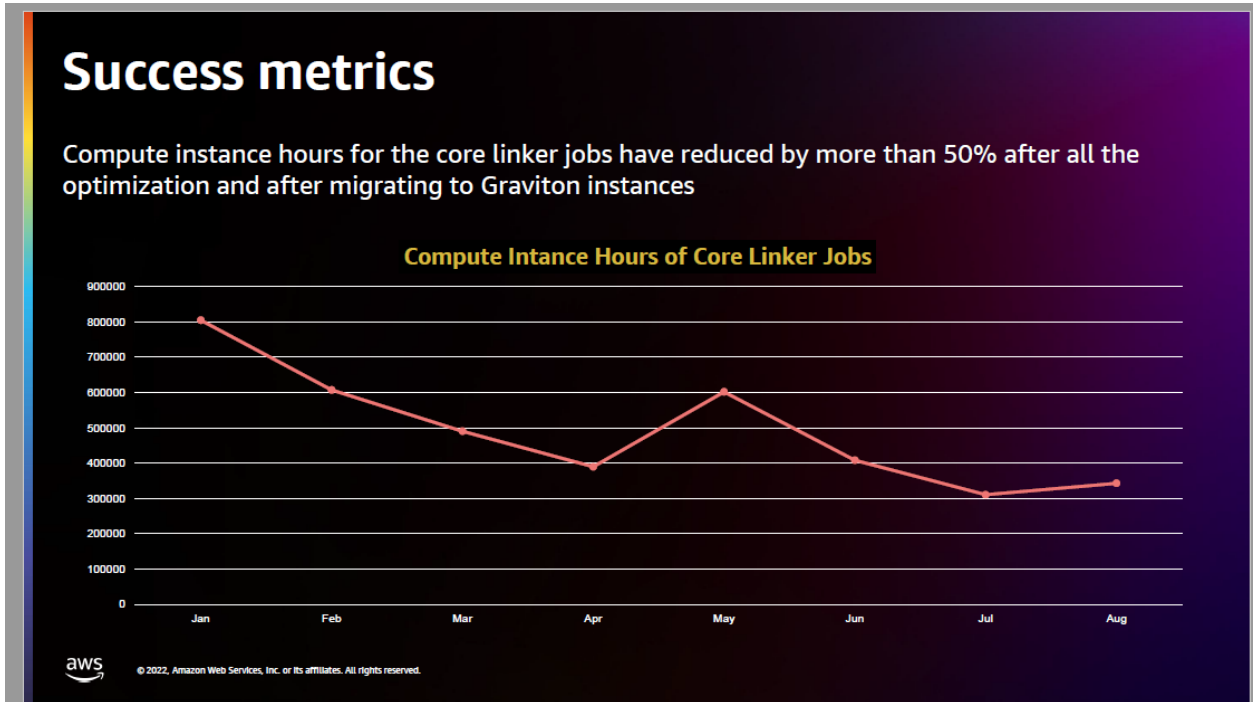


```
graph TD; A[Impact of Bad Nodes] --> B[Fetch failures impacting Apache Spark job/stage completion.]; A --> C[Inconsistent Task performance on Apache Spark jobs]; A --> D[Stuck tasks on Apache Spark jobs];
```



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Slide 11.



Slide 12.

