

4IR Technologies:

**Quantum technologies,
AI**

Emirate:

Sharjah

Maturity:



Operational Deployment

Type:

Public-Private

LOGISTICS

049

Real-Time Aircraft Stand Allocation Using Quantum- Ready Optimisation

ACTORS

APEX

Qamia

Sharjah International Airport

SNAPSHOT

Sharjah International Airport handled 19.48 million passengers in 2025, up nearly 14% on the previous year,¹ across 44 usable stands,² an average of more than 440,000 passengers per stand. Its footprint cannot expand at the same pace: the terminal expansion now underway is a multi-year build that adds capacity far more slowly than traffic is rising.³ APEX, developed by Qamia, a UAE-based quantum-computing company, in cooperation with SPARK (Sharjah Research Technology and Innovation Park), is a real-time AI decision engine that optimises how arriving and departing aircraft are assigned to those stands. Validated over 62 days of live operations, it added capacity from the same infrastructure in software rather than concrete.⁴

WHY IT MATTERS

Sharjah is among the region's fastest-growing airports, handling 116,657 aircraft movements in 2025 with an AED 1.24 billion terminal expansion underway aiming to accommodate 25 million passengers by 2027.^{5,6} In 2025 it was the third-busiest airport in the UAE, after Dubai and Abu Dhabi, which handled 95.2 million and more than 33 million passengers respectively.⁷ Stand allocation, deciding which aircraft occupies which stand and when, has traditionally relied on manual or rule-based planning. Duty managers build the day's plan one flight at a time on a Gantt chart, checking each constraint as they go. With roughly 320 movements a day across 44 stands, the number of feasible combinations is astronomically large, and rebuilding the plan by hand after a schedule change takes 30 to 60 minutes.⁸

The shift is from static human heuristics to real-time, constraint-aware optimisation that resolves automatically as schedules change, extracting more throughput from a fixed number of stands without pouring more concrete. For an airport growing faster than its infrastructure can expand, this is not an efficiency upgrade. It is the difference between capacity constrained and capacity unlocked.

HOW THE TECHNOLOGY WORKS

APEX runs on FENNEQ, Qamia's reasoning and optimisation platform. FENNEQ reads the day's flight schedule together with Sharjah's full operational rulebook: aircraft-to-stand size compatibility, adjacency constraints, airline priorities for boarding-bridge usage, and all time-buffer rules between consecutive flights on the same stand. It compiles everything into a single mathematical model in which every safety rule is a hard constraint, not an after-the-fact check.⁹

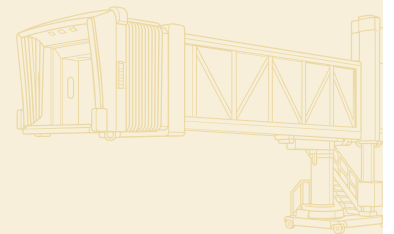
A portfolio of solver agents, classical, hybrid, and quantum, with quantum applied where it outperforms, then searches all feasible whole-day allocations simultaneously rather than flight by flight, returning the best plan in approximately 3 seconds. When a delay hits, the system re-optimises in seconds, adjusting other allocations only where necessary and minimising changes for flights arriving soon. APEX supports decisions; it does not replace human judgement. Duty managers review each proposed allocation and can confirm or override it. The system never refuses a manual change unless it creates a rule conflict.¹⁰

**198
SAFETY
VIOLATIONS**

eliminated by construction

**USD
45–75M
VALUE ESTIMATED**

in annual operational
savings and new revenue



IMPACT AND RESULTS

Validated against 62 days of actual Sharjah operations (July to August 2025, 9,654 flights), head to head against experienced human planners and then on live real-time data, APEX eliminated all hard safety violations (from 198 to zero), guaranteed by construction because rule-breaking plans cannot be generated. It placed 738 additional flights on passenger boarding bridges over the period, an average of 11.9 additional bridge allocations per day and a 20.2% increase in jet-bridge utilisation.¹¹

All operational KPIs improved alongside these results: priority flights (full loads, critical connections, quick turnarounds) moved onto bridges, short-sector flights onto dedicated short-sector stands, and long ground-time and night-stop aircraft onto remote aprons, freeing contact stands for high-value traffic. Qamia estimates the resulting operational savings, capital avoidance, and new revenue at approximately USD 45 to USD 75 million per year for the operator.¹² That is capacity unlocked in software, complementing rather than competing with the physical terminal expansion.



WHAT'S NEXT

Scaling to full airport-wide, all-carrier coverage depends on deeper integration with Sharjah's operational systems and controller workflows, including data access from every carrier. The FENNEQ platform extends beyond aviation, with a telecom deployment already underway and the aviation roadmap targeting further airports across the GCC and beyond. Qamia has also signed a letter of intent with Aramco to apply FENNEQ to energy-sector optimisation and secured an AED 8 million grant with the University of Sharjah for research in post-quantum cryptography and quantum networking.¹³

The opportunity lies in operators coming to treat real-time optimisation as core infrastructure rather than an optional aid. If APEX's results at Sharjah hold across other airports, the implication is that significant capacity gains can be extracted from existing infrastructure globally through software, at a fraction of the cost and time required for physical expansion.

"We map a messy operational problem into one clean mathematical form and route it to the best solver, classical, hybrid, or quantum. At Sharjah that unlocked real capacity from existing stands; the architecture is quantum-ready for when quantum wins," said Raouf Dridi, Founder and CEO, Qamia.¹⁴

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