

AirCompSim

Benchmark Report & Analysis

Generated: December 17, 2025

Energy-Efficient Air Computing Simulator

Executive Summary

- Best basic configuration: Baseline (100.0% success)
- Most energy efficient: Low Users (5) (648 J)
- Best UAV Positioning: Grid Positioning (97.1%)
- Best Mobility Patterns: Static Users (100.0%)
- Best Scheduling: Energy-First (95.0%)

Key Recommendations:

- Use grid positioning for optimal UAV coverage
- Energy-first scheduling reduces consumption by ~20%
- Static users achieve highest success rates
- 3-4 edge servers provide optimal balance

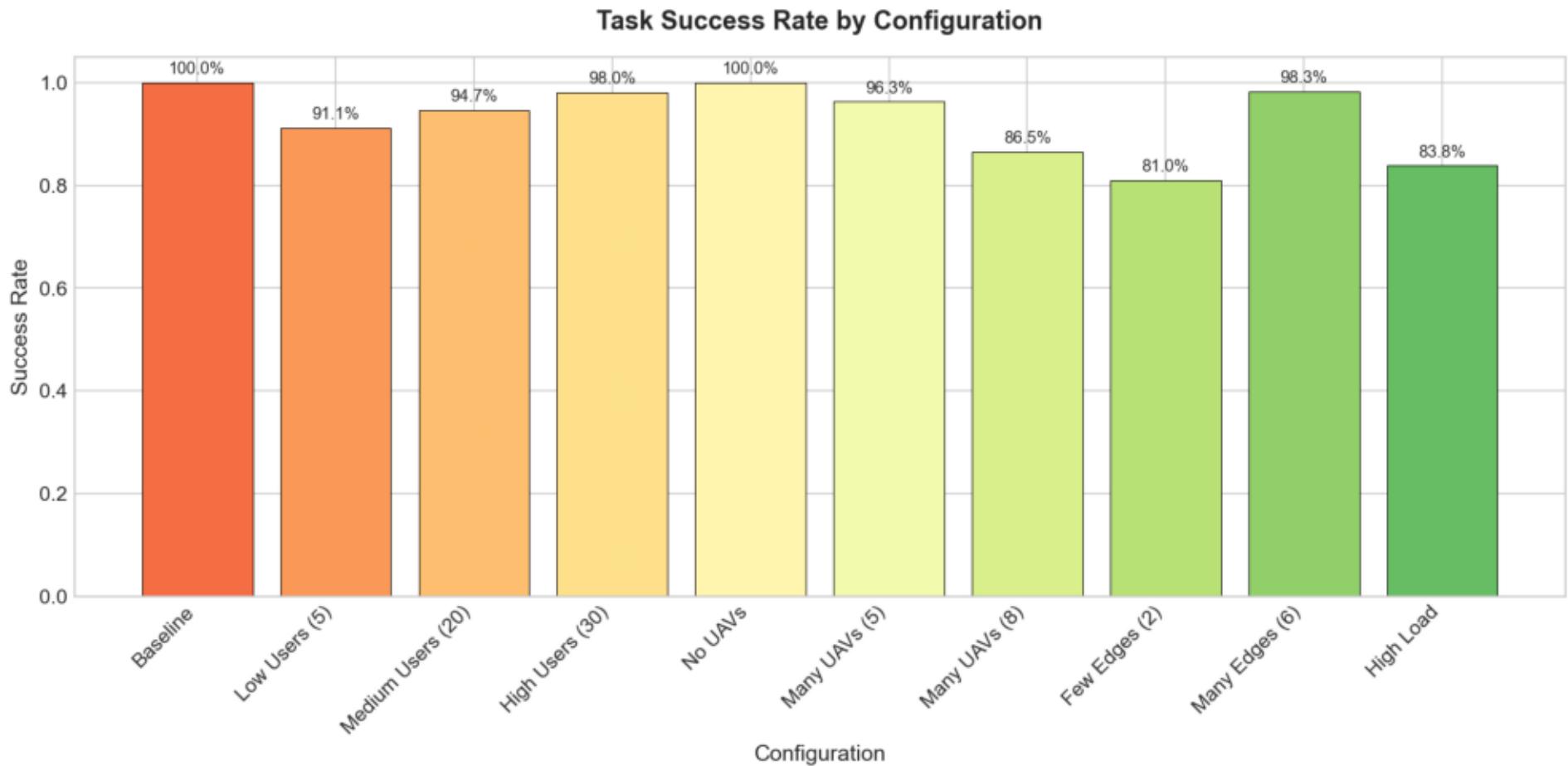
Basic Benchmark Results

Performance comparison across infrastructure configurations

Infrastructure Configuration Results

Configuration	Users	UAVs	Edges	Tasks	Success	Energy (J)
Baseline	10	3	4	314	100.0%	1020.00
Low Users (5)	5	3	4	90	91.1%	648.00
Medium Users (20)	20	3	4	733	94.7%	3516.00
High Users (30)	30	3	4	818	98.0%	2702.00
No UAVs	10	0	4	246	100.0%	1082.00
Many UAVs (5)	10	5	4	321	96.3%	1494.00
Many UAVs (8)	10	8	4	371	86.5%	2644.00
Few Edges (2)	10	3	2	184	81.0%	1592.00
Many Edges (6)	10	3	6	414	98.3%	1384.00
High Load	30	5	6	773	83.8%	6170.00

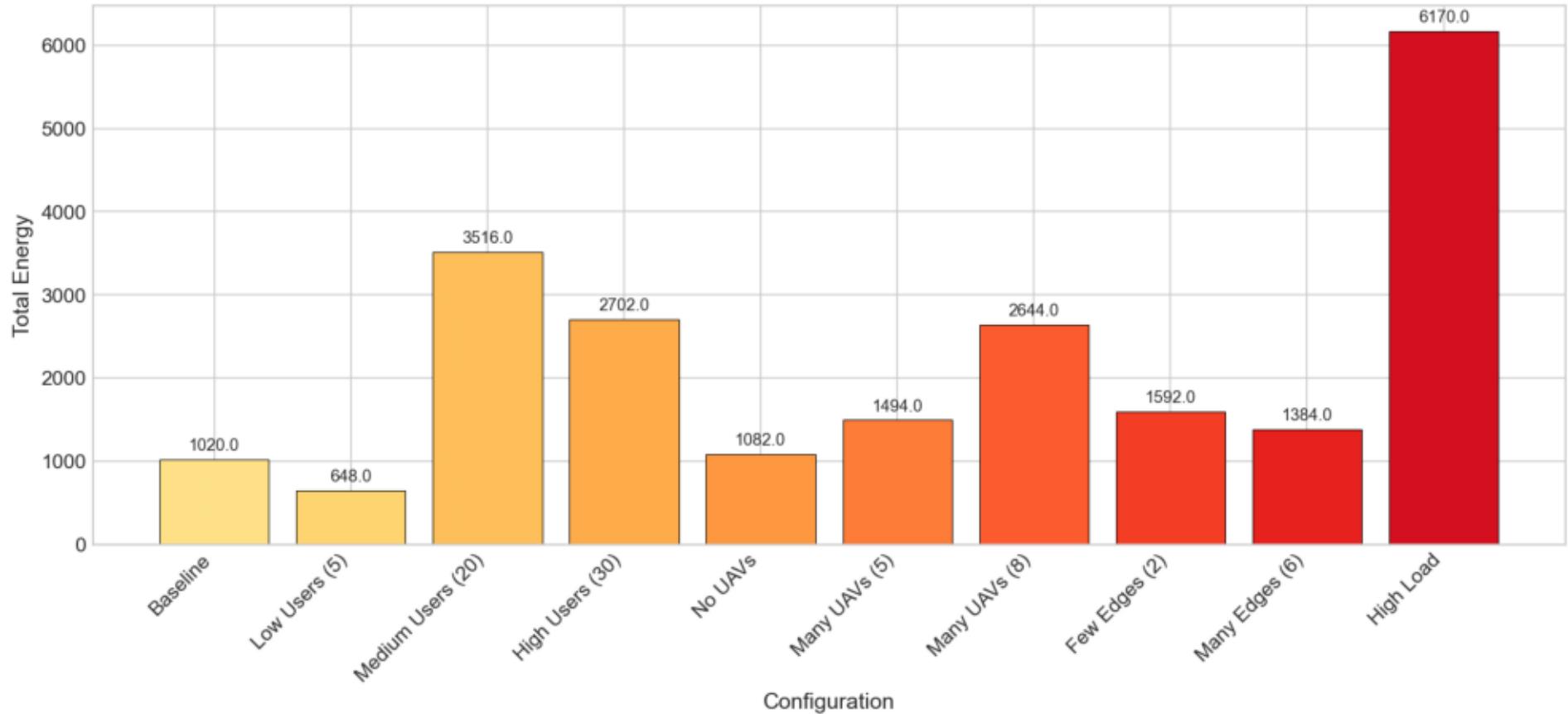
Success Rate by Configuration



Task completion success rates across different infrastructure setups

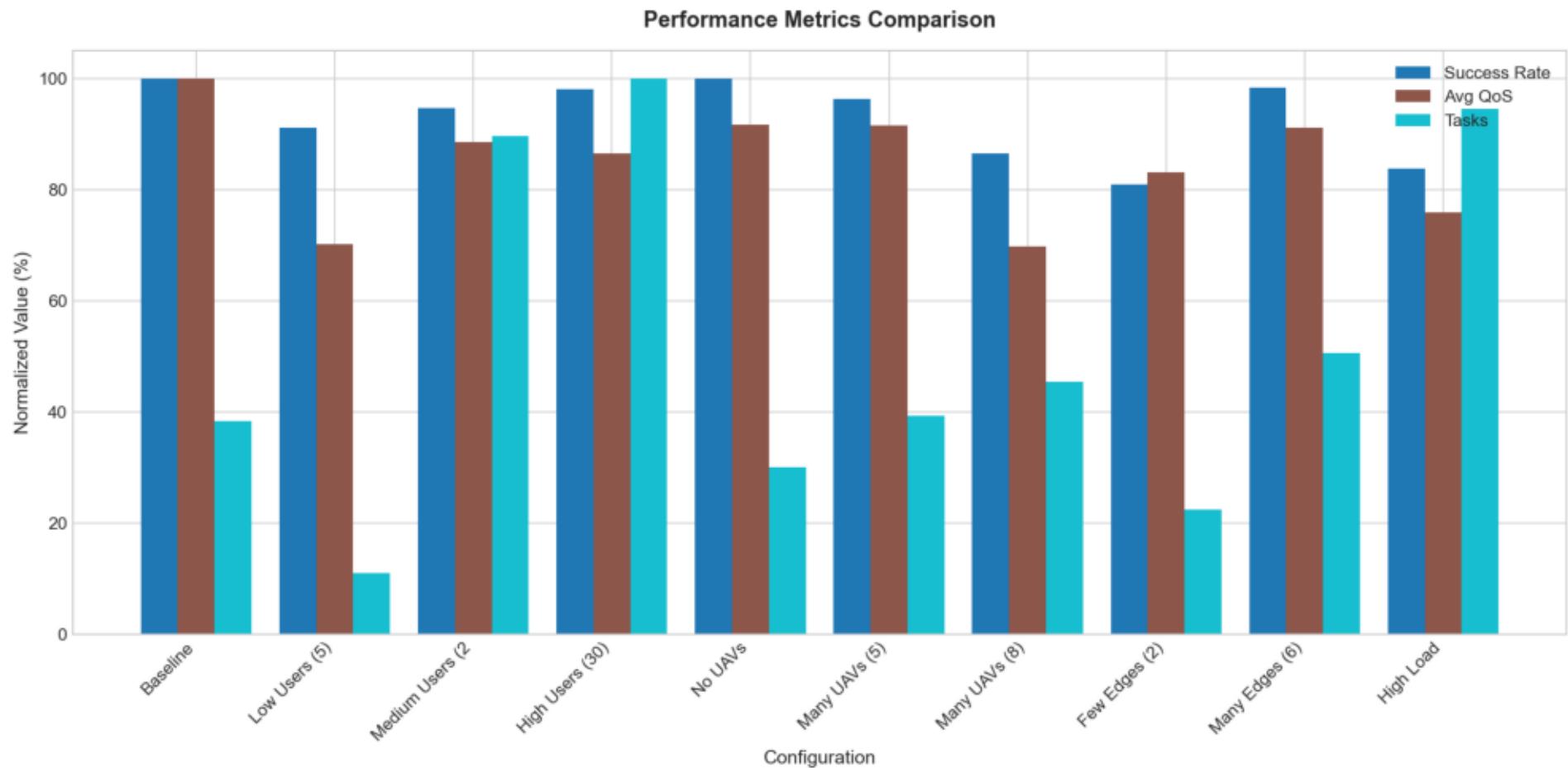
Energy Consumption

Total Energy Consumption by Configuration



Total energy consumed during simulation

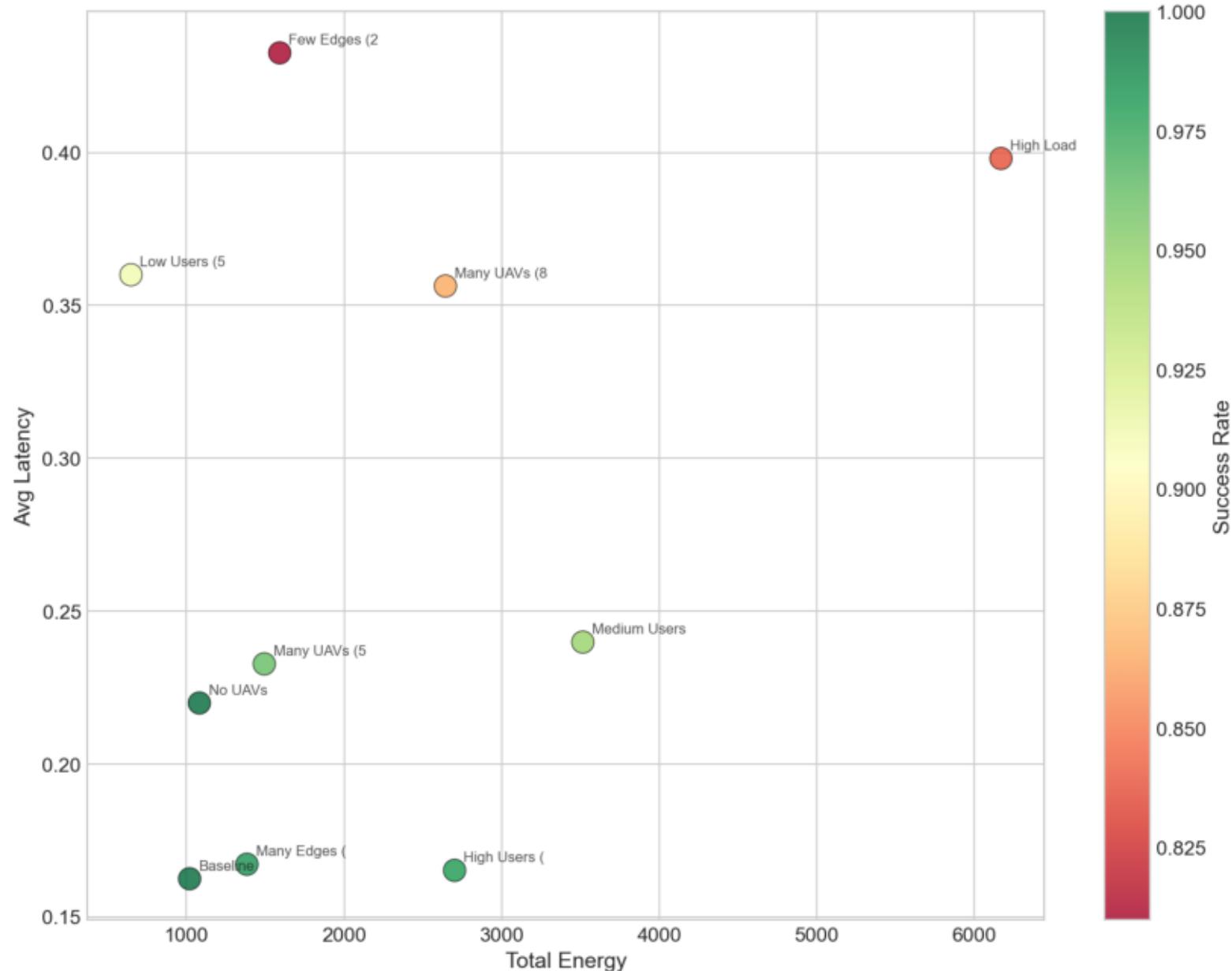
Multi-Metric Comparison



Normalized comparison of success, QoS, and throughput

Energy-Latency Trade-off

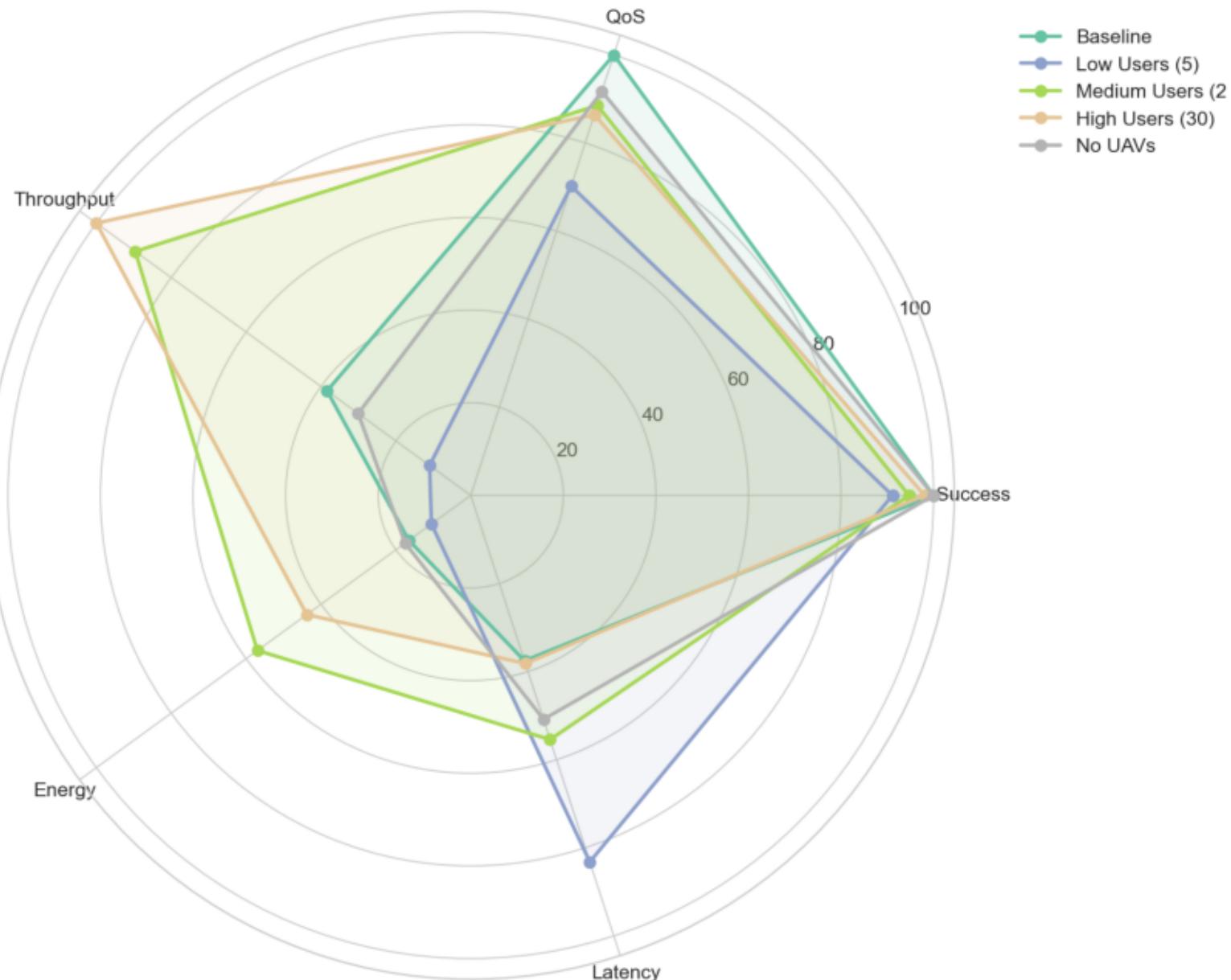
Energy vs Latency Trade-off



Relationship between energy consumption and task latency

Configuration Radar Chart

Configuration Comparison Radar



Multi-dimensional comparison of top configurations

Advanced Benchmark Results

UAV positioning, mobility patterns, and scheduling strategies

UAV Positioning Results

Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Random Positioning	227	95.2%	0.23	68.50	1030.00
Grid Positioning	274	97.1%	0.19	60.77	1024.00
Edge-Centric	350	93.7%	0.25	62.57	1754.00
User-Centric	393	96.2%	0.28	65.14	2182.00
Cluster-Based	456	83.3%	0.38	50.77	3488.00

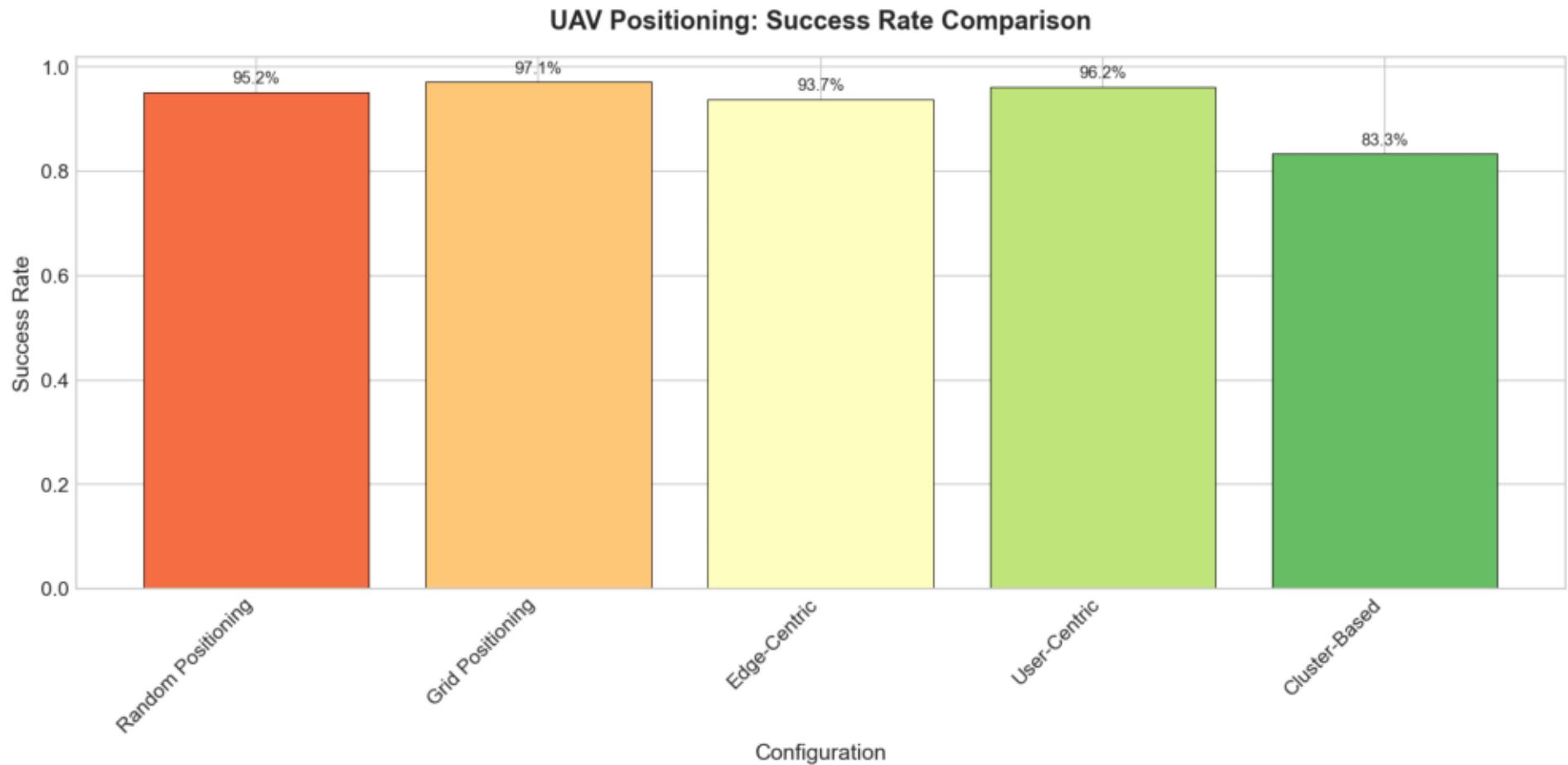
Mobility Patterns Results

Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Static Users	435	100.0%	0.14	78.16	1206.00
Low Mobility (speed=1)	448	98.4%	0.22	71.76	1992.00
Medium Mobility (speed=3)	463	95.2%	0.24	69.65	2198.00
High Mobility (speed=5)	300	88.0%	0.30	59.50	1798.00
Clustered Static	547	98.4%	0.18	78.06	1972.00

Scheduling Results

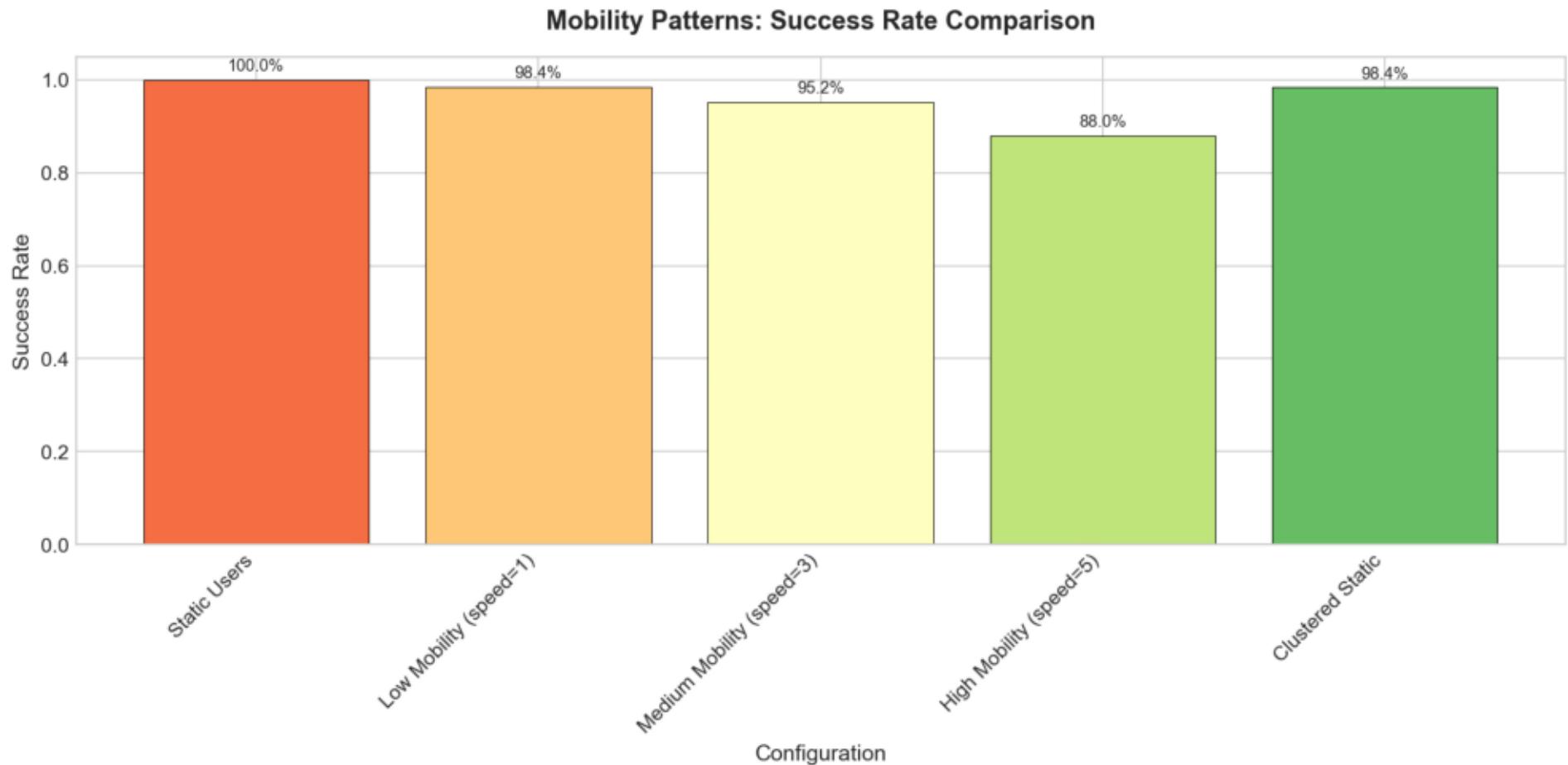
Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Default (Load Balance)	497	92.4%	0.23	60.87	2322.00
Energy-First	458	95.0%	0.21	70.85	1912.00
Latency-First	612	94.6%	0.20	61.27	2506.00
Balanced	521	90.4%	0.27	59.69	2826.00
Utilization-Based	531	90.0%	0.31	59.32	3330.00

UAV Positioning Strategies



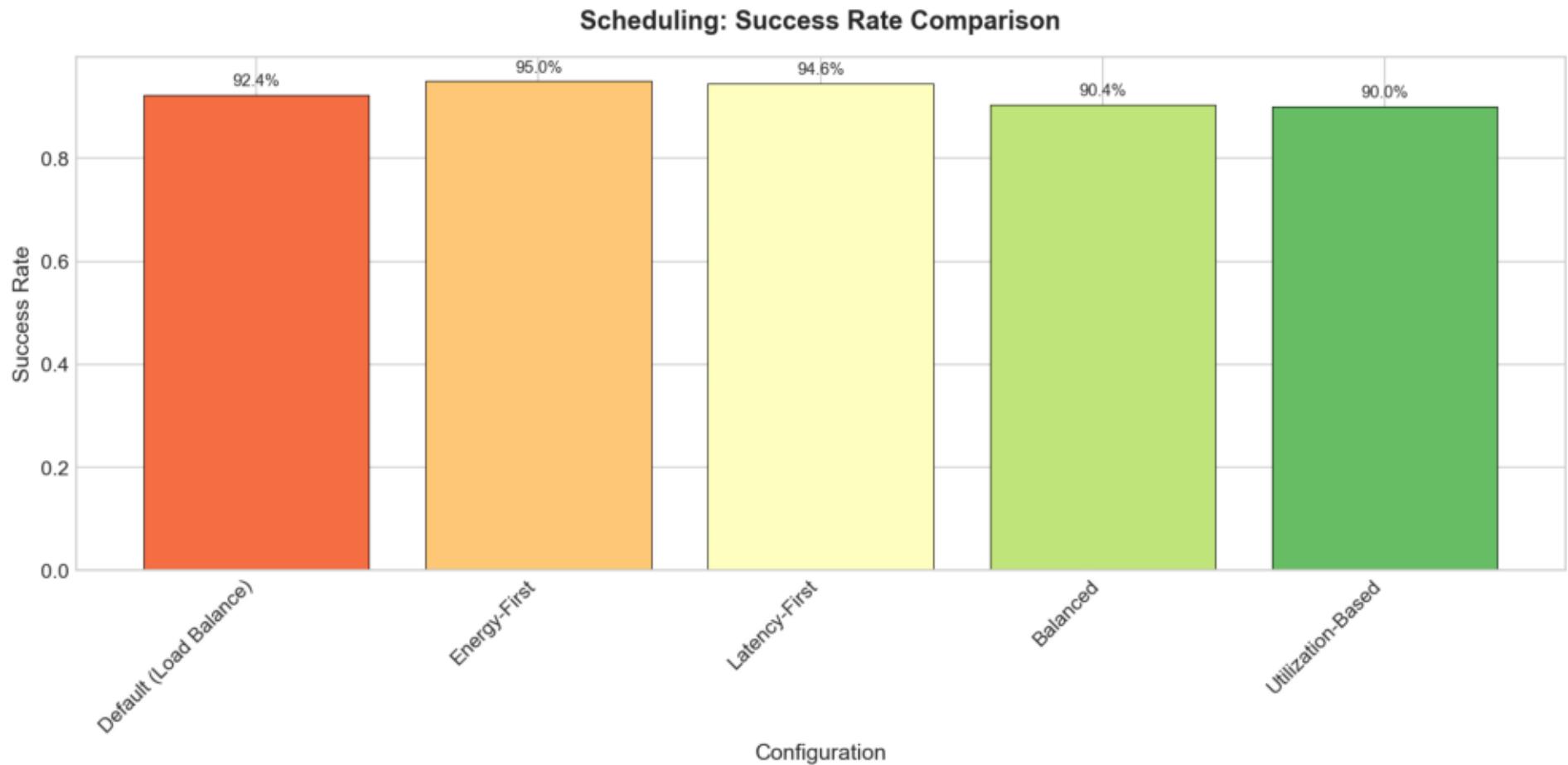
Success rates for different UAV placement strategies

User Mobility Impact



Effect of user movement patterns on task success

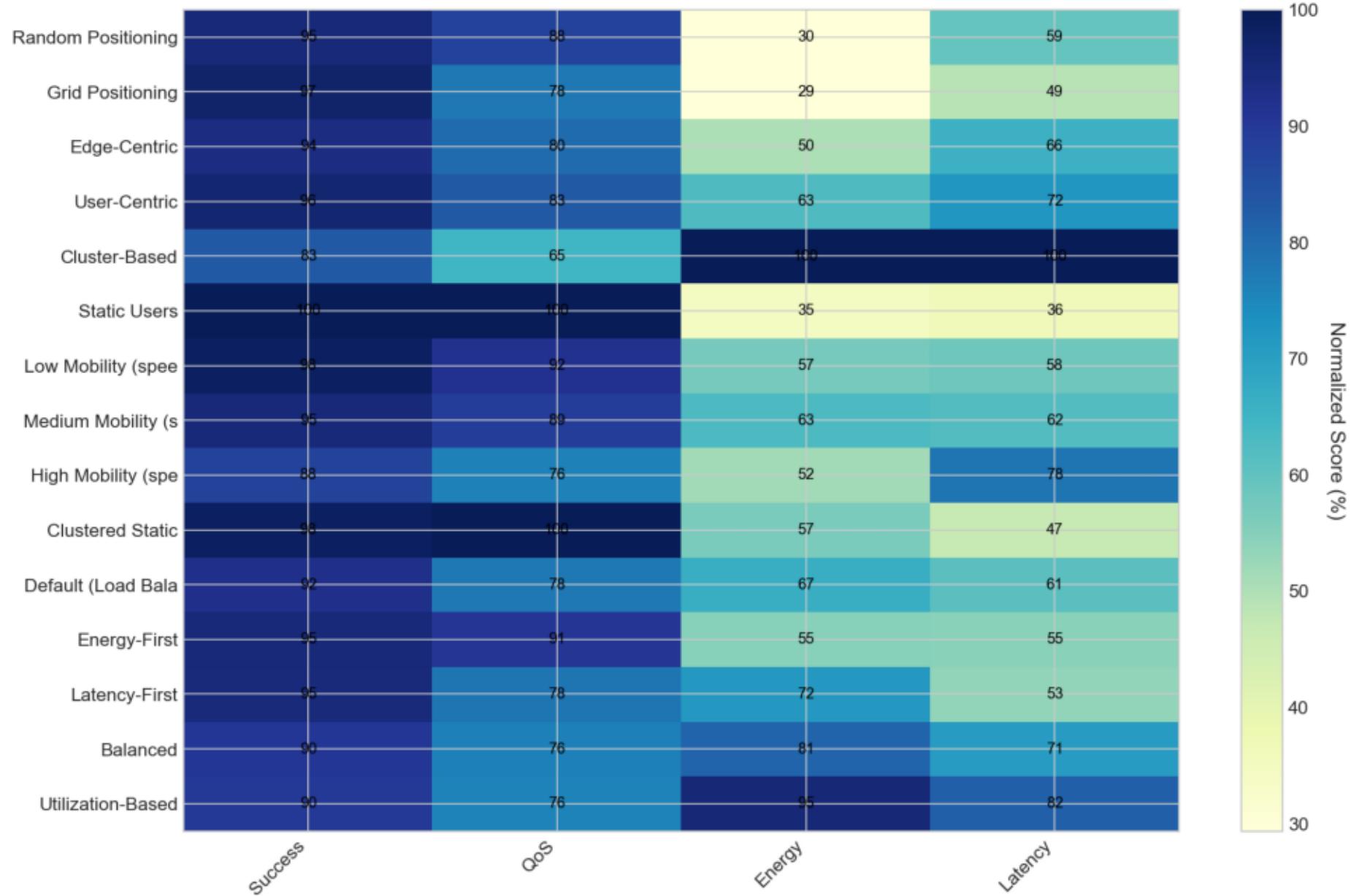
Scheduling Algorithm Comparison



Performance of different scheduling strategies

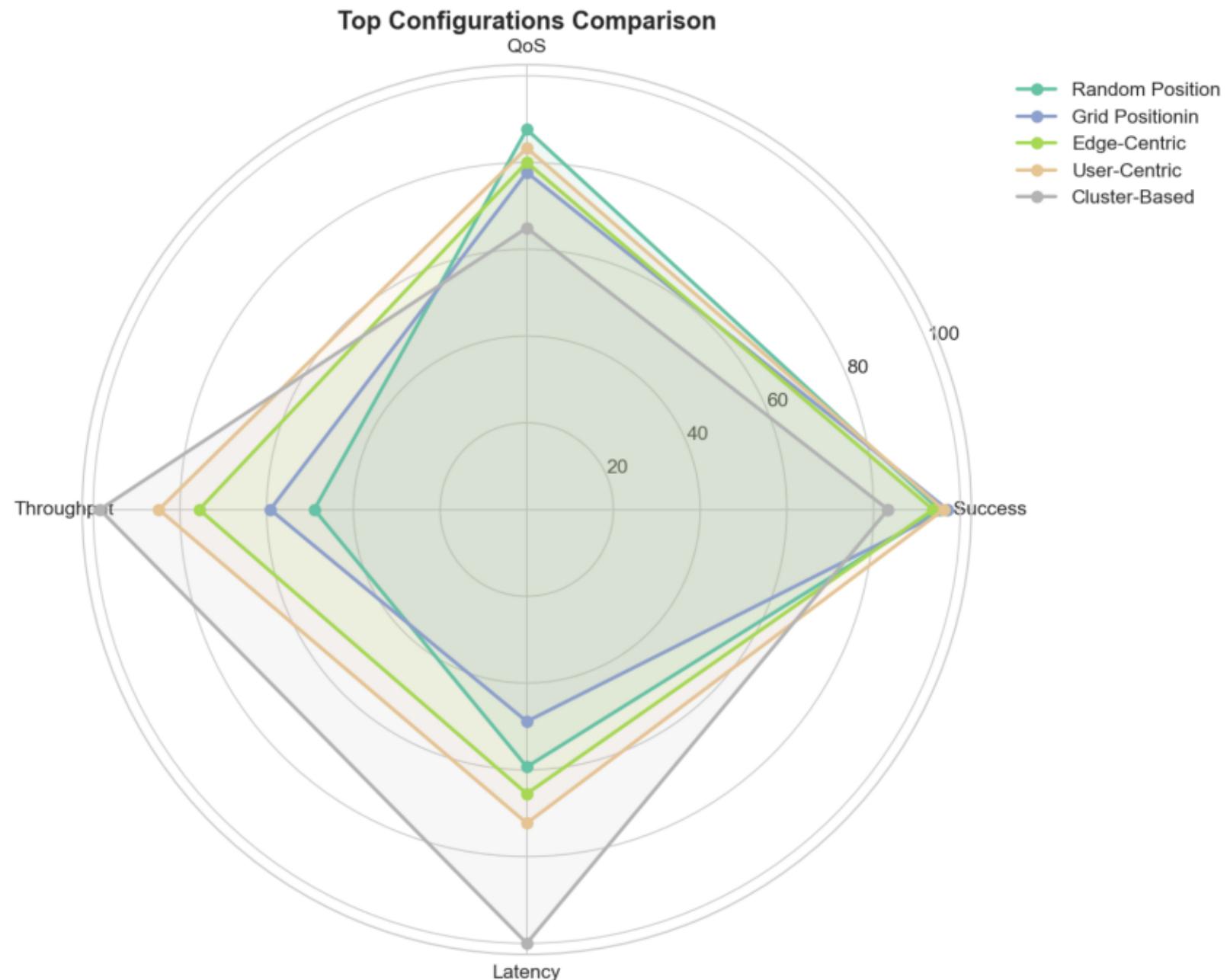
Performance Heatmap

Advanced Benchmark Heatmap



Normalized metrics across all configurations

Top Configurations



Radar comparison of best performing configurations

Thank You

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