



SCO International Olympiad

Anti-Cheating Online Exam System

Proctored integrity + fair scoring

1

Secure delivery

Reliable exams at high scale

2

Integrity signals

Heartbeat, tab activity, markers

3

Fair scoring

Risk bands + policy penalties

4

Transparency

Clear results for students

Large-scale online exams need:

Integrity

Discourage malpractice
Protect genuine students

Fair Scoring

Transparent risk bands
Policy-driven adjustments

Scale & Reliability

Stable at high concurrency
Low-latency event capture

SCO is built for proctored integrity where performance, security, and fairness scale together.

4 pillars

- Continuous identity & presence monitoring
- Integrity signals (heartbeat, tab activity, behavior markers)
- Tamper-resistant discipline rules and enforcement
- Policy-based risk scoring and fair score adjustment

Monitor
Presence + identity

Detect
Integrity events

Score
Risk band + integrity score

Finalize
Adjusted final score

1

The right student stays present throughout the attempt

Detect suspicious session patterns without disrupting genuine students.

- Continuous presence checks during the exam session
- Detects repeated leaving of the screen, abnormal session breaks, or suspicious environment patterns
- Keeps monitoring lightweight to preserve exam performance at scale
- Supports evidence-based review when escalation is required

Key signal categories

- Heartbeat monitoring - confirms the session is live and active
- Tab activity detection - captures tab_hidden / tab_visible patterns
- Behavior markers - flags suspicious activity sequences
- Batch event reporting - sends multiple events in one secure post

Built for scale

- **Secure posts**

Events are transmitted securely to prevent tampering

- **Low overhead**

Batching reduces network and database load

- **Stable during peak**

Exam delivery remains fast even at high concurrency

- **Complete trail**

Integrity history preserved for audit and review

Strong exam discipline rules

Clear instructions + enforceable controls to keep exams fair for everyone.



Stay on the exam screen

No tab switching or navigation away from the exam.



Camera & mic permissions

Keep camera/mic enabled where required by the exam policy.



Stable device & internet

Desktop/laptop preferred • stable connection for uninterrupted delivery.



No external help

Solo attempt • no books, phones, or assistance during the exam.

Risk signals become an integrity score and a policy band

Transparent and easy for schools and parents to interpret.



- Integrity Score is simple to read (example: 100 = clean attempt)
- Risk Bands summarize behavior levels for fast decision-making
- Banding is policy-driven and can be tuned per exam type or age group

Current proctor risk policy (example)

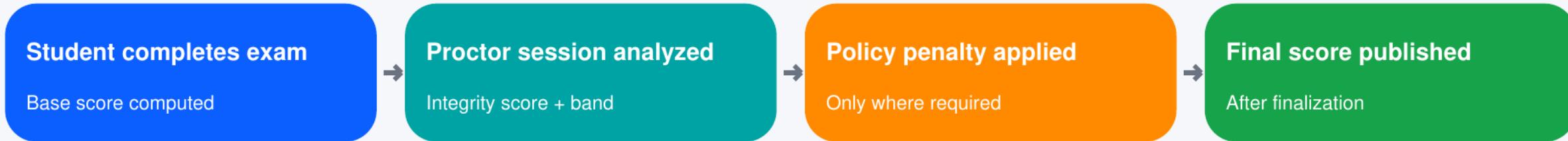


Policy table maps risk score ranges to penalty and outcome. Configurable per exam.

Band	Risk Range	Result Meaning	Penalty	Outcome
Excellent	0-19	Clean attempt	0%	Fully valid
Good	20-39	Minor risk	2%	Slight adjustment
Average	40-59	Moderate risk	5%	Controlled adjustment
Alert	60+	Serious violation	100%	Disqualification possible

Note: 'Alert' can trigger warnings, review flags, and evidence preservation as per policy.

Final score includes integrity - not just marks



- Honest students are rewarded fairly
- Malpractice attempts do not gain advantage in ranks
- Schools gain confidence that rankings reflect genuine performance

Alert band can trigger warnings, flags, and disqualification workflows

System actions

- Flag attempt for violation review
- Display on-screen warning (Alert / Disqualification risk)
- Apply full penalty as per configured policy
- Record and preserve supporting evidence for audit

Why it works

- Strong deterrent effect for malpractice
- Protects genuine students from unfair competition
- Evidence trail supports fair, explainable decisions

Smooth during exam hours, accurate after the window closes

During the exam

- Focus on smooth delivery
- Secure event capture
- Low-latency monitoring

After exam window (e.g., midnight)

- Compute proctor summaries
- Apply policy penalties
- Store finalized results

Next day

- Show final integrity score + band
- Display penalty (if any)
- Publish adjusted final score

This workflow reduces peak load while keeping integrity decisions consistent and auditable.

What students see

- Exam Score (Base Score)
- Proctor Status (Pending until finalized)
- Integrity Score (after finalization)
- Risk Band (Excellent / Good / Average / Alert)
- Penalty percentage applied (if any)
- Final adjusted score
- Disqualification alert (if applicable)

Why transparency matters

• Builds trust

Students understand how integrity impacts outcomes

• Reduces disputes

Clear banding and penalties remove ambiguity

• Improves behavior

Visible integrity scoring discourages misconduct

Key strengths

- ✓ Strong anti-cheating controls without disrupting genuine students
- ✓ Integrity scoring + policy banding makes decisions transparent
- ✓ Penalty model prevents unfair advantage in ranks
- ✓ Designed for high-scale concurrency and stable performance
- ✓ Results are more meaningful because integrity is included

Enable proctored, fair online Olympiads at scale

Batch integrity events (secure + scalable)

Multiple signals in one post — lower overhead, complete audit trail.

Event pipeline



Student browser

tab_hidden, heartbeat, markers



Secure POST (batch)

signed payload • replay-safe



ProctoringSession store

append-only event trail



Risk scoring job

aggregates severity → band

Example payload (batch)

```
{  
  "studentTestLogId": "STL...e5a41",  
  "events": [  
    { "t": "heartbeat", "ts": 1700 },  
    { "t": "tab_hidden", "ts": 1712 },  
    { "t": "tab_visible", "ts": 1718 },  
    { "t": "marker", "k": "suspicious_pattern", "ts": 1731 }  
  ]  
}
```

Why batching helps at scale

- Fewer network calls per student
- Lower DB write amplification
- Complete, ordered audit trail
- Stable exam delivery under peak load