



# SCO International Olympiad

## Anti-Cheating Online Exam System

Proctored integrity + fair scoring

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### Secure delivery

Reliable exams at high scale

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### Integrity signals

Heartbeat, tab activity, markers

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### Fair scoring

Risk bands + policy penalties

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### 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

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## 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)

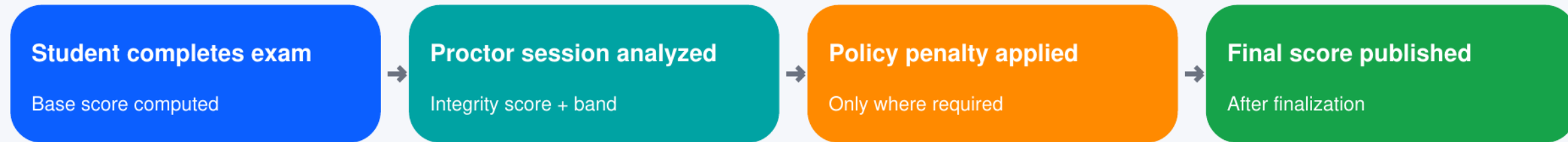
Policy table maps risk score ranges to penalty and outcome. Configurable per exam.

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