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Mark Scheme (Results)
January 2011

GCE

GCE Applied ICT (6959/01)

Communications and Networks

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Activity 1 — Transmission media

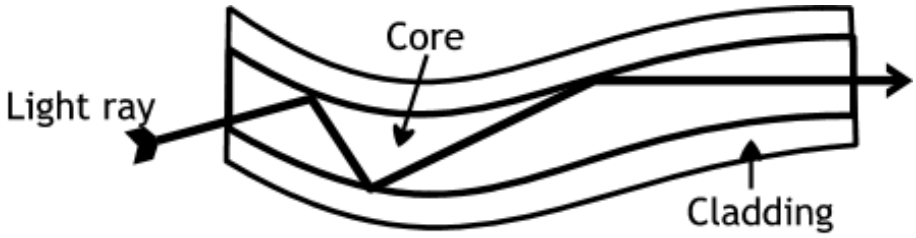
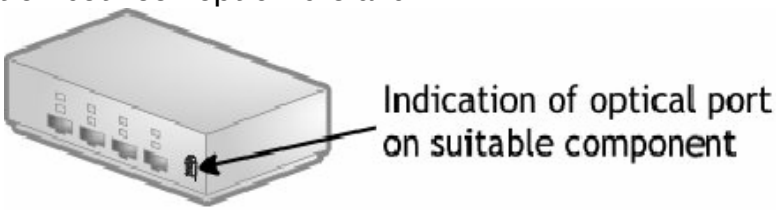
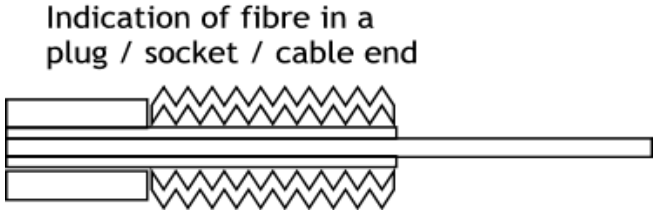
Question Number	Answer	Mark
1	Indicative content: a set of notes for Janet about three contactless systems	
	First two methods For proximity and / or vicinity diagram shows radio loop / transmitter diagram shows mobile device containing a circuit / transmitter-receiver For vicinity diagram shows radio receiver For proximity diagram shows touch pad Descriptions might include , energy from electromagnetic / EM field from terminal, no batteries / internal power source needed **Differences between proximity and vicinity** The **main (needed)** difference is the range. (This may be shown in the diagrams) Proximity = touch (0 - 10 cm) Vicinity = nearby (1 - 2 metres) **Other differences**. ISO numbers, transfer rates, power requirements, security. **Third method**. (No direct contact between the reading device and the object being read.) A diagram showing a sensible method. e.g. fingerprint / palmprint / other reasonable biometric. Bar coded card / other passive scanable item. **NOT** manual methods, e.g. typing entry codes / passwords, workers looking at I.D. A reasonable note about how it works, stating range / must touch.	
	Indicative content for recommendation with reasons.	
	Reasons must relate to the issues given in the scenario: 1. The holiday park will be open to day visitors as well as residential guests. Some form of electronic access control will be required at the footbridges to keep the day visitors out of the apartment area. 2. Residential guests will have free use of all the rides, (log flume, rapids ride and boating lake). Day visitors will pay as they go. 3. The rides, bar-cafes, and the ticket office must be connected to the LAN. 4. A residential guest must be able to obtain items at the bar-cafes and charge the cost to their account. 5. People are likely to be wearing only a swimming costume. 6. Residential guests will include children who may use the Water Wonders facilities unaccompanied. Parents must be given a method of restricting a child's privileges. e.g. what they may purchase and which rides they may use. 7. Any access or payment device used in the system must be waterproof, shockproof and robust. It must use contactless technology. (No direct contact between the reading device and the object being read.) 8. There should be a common method of operation for all access and payment points. Indicative reasons: • suitable for adults and children. e.g. automatic recognition / no PINs or passwords to remember • robust and waterproof. e.g. embedded in plastic / no exterior contacts / no battery needed / solid state / uses a biometric • usable for access. e.g. preprogrammed code for footbridges / rides / biometric identifies user / more difficult to copy • usable for payment. e.g. individual codes / biometric and connection to accounts computer • wearable device such as a wristband. e.g. any sensible suggestion, wristband, belt clip, neck strap / uses a biometric	**(12)**

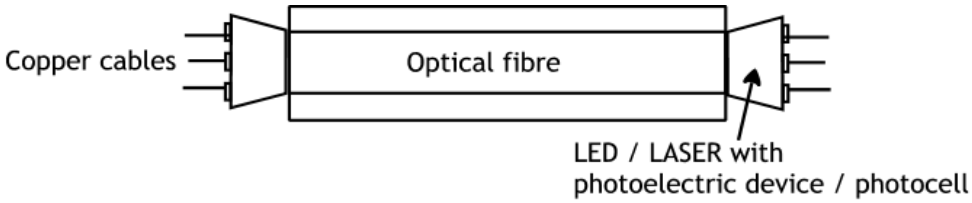
	• parental controls. e.g. connection to a terminal for parents to choose restrictions / additional information can be added e.g. medical conditions • proximity / biometric / barcode better than vicinity for payment and parental control as it requires a positive action (touch) by the user • cost comparisons. Reverse arguments as reasons not to recommend are acceptable but would need to address both rejected choices as one point.	

QWC for Activity 1

Level	Mark	Descriptor
0	0	No rewardable material.
Level 1	1-4	Notes have simple diagrams with little or no text. Or have text but no diagrams. Notes have reasons that only address one or two requirements of the scenario. (suitable for adults and children, robust and waterproof, usable for access, usable for payment, wearable device such as a wristband, parental control) The candidate uses everyday language and the response lacks clarity and organisation. Spelling, punctuation and the rules of grammar are used with limited accuracy.
Level 2	5-8	Notes have diagrams or a detailed description for the proximity and vicinity systems that illustrate some technical detail. The text refers to the difference between them. There is some attempt at a contactless third system. Notes have reasons which address at least three of the scenario requirements.(suitable for adults and children, robust and waterproof, usable for access, usable for payment, wearable device such as a wristband, parental control) The candidate uses some terms and shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy.
Level 3	9-12	Notes have clear diagrams for the proximity and vicinity systems that illustrate some technical details. The text makes clear the difference between them. There is a sensible description of a contactless third system. Notes have reasons which address at least four of the scenario requirements.(suitable for adults and children, robust and waterproof, usable for access, usable for payment, wearable device such as a wristband, parental control) The candidate uses a range of appropriate terms and shows good focus and organisation. Spelling, punctuation and the rules of grammar used with considerable accuracy.

Activity 2 - Network connectivity.

Question Number	Answer	Mark
	Required evidence for 2a and b: training material explaining how the fibre optic connection works	
	2(b) is about fitness for purpose, this should be assessed while marking 2(a)	
2 a (i)	Signal transmission. Example diagram  Any 3 points from: Text and / or diagram indicates: • core and cladding (may also have outer coating) (1) • light (ray) reflecting (1) • multiple light paths (1) Text describes: • total internal reflection / difference in refractive index (1) • signal loss due to attenuation / absorption / scattering (1) Maximum 3 marks	**3**
2 a (ii)	Connection between optic fibre and LAN.  Example diagrams. Any 3 of: Text and / or diagram indicates / describes: • named plug and / socket type. e.g. ST, SC, SFP (1)  • protruding end of core (exaggerated in example) (1) • connection mechanism. e.g. bayonet, push and twist, push and click (1) • core alignment / centering mechanism (1) Maximum 3 marks	**3**

2 a (iii)	Conversion between the copper and fibre optic signals. Example diagram.  Any 3 of: Text and / or diagram indicates / describes: • LED / LASER / light producing device (1) • light produced by electrical signal (1) • photocell / photoelectric layer / light detecting device (1) • light produces electricity (1) • other good science. e.g. semiconductors Maximum 3 marks	**3**
2 (b)	Presented as Training material / fit for purpose. 1 mark for each of: • Fits neatly on two sides, no page separation of text and related diagram(s), no paragraph split, no large white spaces. (1) • Looks like training material, text with embedded diagrams, set out in sections. (1) • Written in everyday language. (1) Maximum 3 marks	**3**

		(12)

Activity 3 - Components of a network

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>3a</td><td>Required evidence for
A table for submission to Janet which identifies the hardware and cabling components to be used on the Water Wonders site, giving a reason for each component.

1 mark per component, with sensible reason. Max 7
Needs to be in context. Allow different numbers if reason justifies.
<table>
<tr><th>Component</th><th>Number</th><th>Reason</th><th>Notes</th></tr>
<tr><td>PC (+screen, keyboard, etc.)</td><td>6</td><td>3 bar-cafe, 3 rides</td><td>Not 7 without a good reason. Ticket office has one already</td></tr>
<tr><td>Switch with fibre optic link capability</td><td>1</td><td>for centre of star + fibre optic link</td><td>Min of 7 ports. 13 if assume that payment points have own cables
Allow switch plus separate optical receiver transmitter</td></tr>
<tr><td>Fibre optic cable</td><td>150 - 250 m</td><td>link between stars</td><td>length depends where candidate sites the switch
Allow here OR in next table (3b)</td></tr>
<tr><td>Fibre optic terminators</td><td>2</td><td>link to switches</td><td>Allow here OR in next table (3b)</td></tr>
<tr><td>Ethernet cable Cat 5 or better</td><td>min 2 boxes / 600 m</td><td>cables to rides + bar-cafes + ticket office</td><td>length depends where candidate sites the switch</td></tr>
<tr><td>RJ 45 ends</td><td>pack of 25</td><td>need 2 per cable / patch lead</td><td>= 14 for the PCs but may add more</td></tr>
<tr><td>Patch leads</td><td>6 to 12</td><td>data socket to PC etc.</td><td>depends on network configuration, check the reason</td></tr>
<tr><td>Data sockets</td><td>6 to 12</td><td>so structural cable does not plug into a PC etc.</td><td>depends on network configuration, check the reason</td></tr>
<tr><td>Internet phone / microphone</td><td>7</td><td>6 new PCs, 1 in ticket office, all need VoIP</td><td>NOT a standard telephone. Must be something that can connect to the network. e.g. a VoIP phone / PC microphone / headset.</td></tr>
<tr><td>Patch panel</td><td>1</td><td>To organise cabling at the switch</td><td>not a requirement, allow with a sensible reason</td></tr>
</table></td><td>7</td></tr>
</table>

3b

Required evidence for 3b

A table for submission to Janet which identifies the hardware and cabling components to be used on the **apartments site**, giving a reason for each component

1 mark per component, with sensible reason.

Needs to be in context. Allow different numbers if reason justifies.

Max 9

9

Component	Number	Reason	Notes
PC (+screen, keyboard,etc.)	min 2	1 for restaurant, 1 for Internet cafe	**NOT** including the 5 already present. Will probably have more than 1 in Internet cafe.
Server	1 or 2	control network	may have server + backup
Switch with fibre optic link capability	1	for centre of star + fibre optic link	Min of 9 ports, more for expansion and extra Internet Cafe PCs Allow switch plus separate optical receiver transmitter
Router	1	for Internet	needs to be telephone broadband
Fibre optic cable	150 - 250 m	link between stars	length depends where candidate sites the switch Allow here **OR** in previous table (3a)
Fibre optic terminators	2	link to switches	Allow here **OR** in previous table (3a)
Ethernet cable Cat 5 or better	min 1 box / 300 m	cables for reception etc.	length depends where candidate sites the switch
RJ 45 ends	pack of 25	need 2 per cable / patch lead	= 18 for the PCs / printers but may add more for Internet Cafe
Patch leads	min 9	data socket to PC etc.	depends on network configuration, check the reason and PC numbers
Data sockets	min 9	so structural cable does not plug into a PC etc.	depends on network configuration, check the reason
Internet phone / microphone	min 6	5 old PCs + restaurant, all need VoIP	**NOT** a standard telephone. Must be something that can connect to the network. e.g. a VoIP phone / PC microphone / headset. May be on Internet cafe PCs as well
Patch panel	1	to organise switch cabling	not a requirement, allow with a sensible reason
Specific printer	1	restaurant	Required by scenario
Other sensible			Must be justified and in context

3c

Required evidence for 3c

A table for submission to Janet which identifies the **software** components to be used in the design

1 mark per component, with sensible reason.

Max 5 **5**

Component	Reason	Notes
Network / server OS	to control the network	probably Windows Server 2008 but allow other sensible
Workstation OS	to run PCs	Probably Windows 7 but allow other sensible
Anti-virus	network has Internet Cafe / connection to Internet	any reasonable version, e.g. Sophos, Norton May be part of OS
Anti-malware	network has Internet Cafe / connection to Internet	any reasonable version, e.g. Spybot, Ad-aware, Defender May be part of OS
Firewall / filter	network has Internet Cafe / connection to Internet	any reasonable version, e.g. Zone Alarm, Outpost May be part of OS
VoIP software	required by scenario	any reasonable version, e.g. Skype, Live Messenger
Other sensible	must match scenario	Not OFFICE software, etc.

(21)

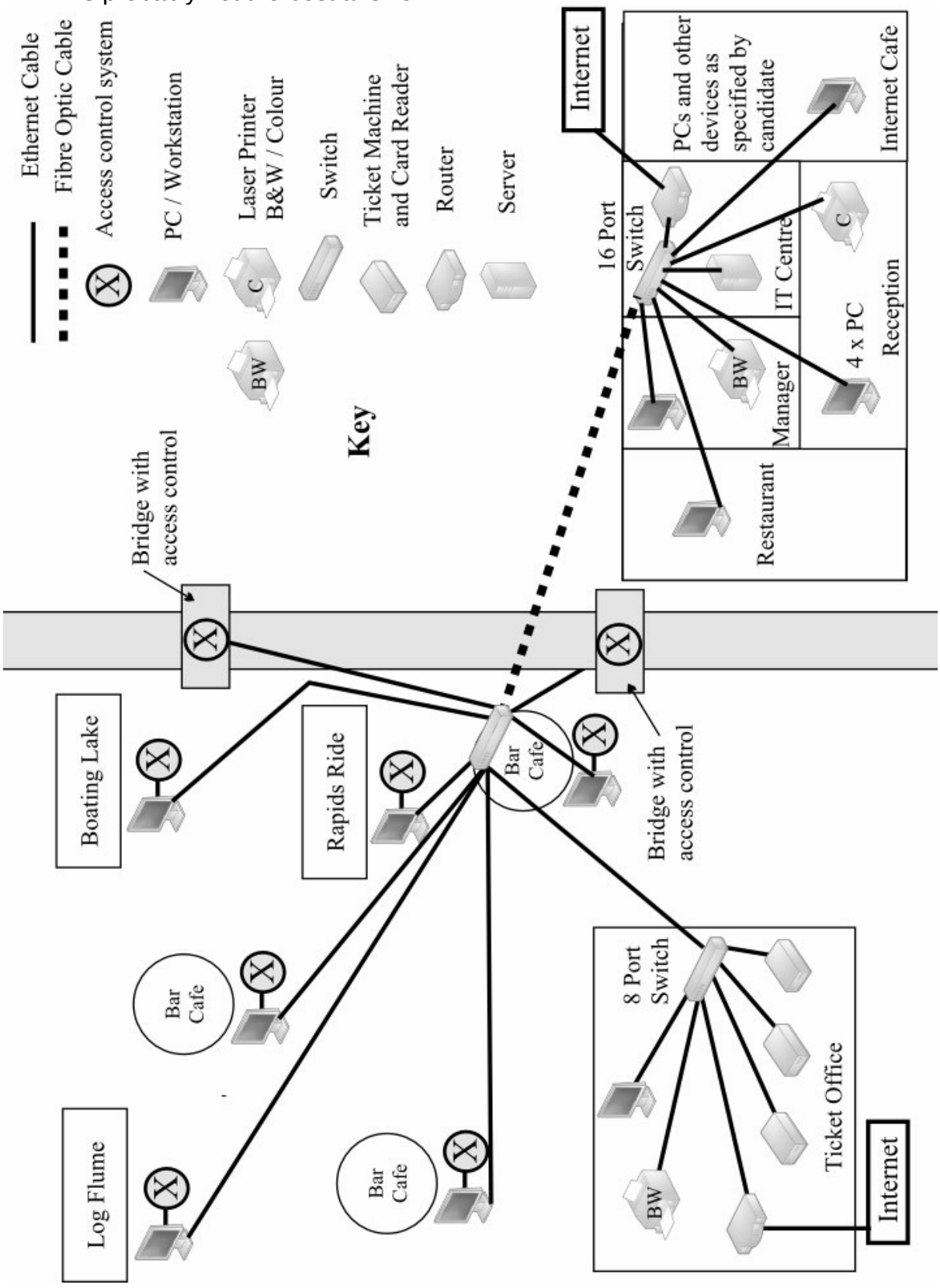
Activity 4 — Network Design

Question Number	Answer	Mark
4a	Required evidence for 4a: **a network design for the complete project**	**16**
	a) Diagram shows; 3 rides, 3 bar-cafes, ticket office, reception block with restaurant and Internet Cafe. b) Diagram shows access control system for footbridges. c) Cable type(s) identified. d) Each ride has PC and access control system. e) Each bar-cafe has PC and access control system. f) Ticket office has PC and networked printer. g) Ticket office has router. h) Ticket office has Internet connection. i) Ticket office has three networked ticket machines. j) Ticket office has an (8 port) switch. k) Water Wonders site, has a central switch in a sensible location. Not in ticket office. With fibre connection to q l) Reception has 4 pcs and a networked colour laser printer. m) Manager's office has PC and a networked B/W laser printer. n) Restaurant has a PC and printer o) Internet Cafe has equipment as specified by candidate. p) Server in sensible position. (not used as a switch, max 3 connections) q) Reception block has central switch (16 port)in sensible position. With fibre connection to k r) Reception block has router. s) Sensible routes from server to router & switch. t) Reception / Internet Cafe has Internet connection. Max 16 marks	
4b	Required evidence for 4b An explanation and justification of decisions made regarding the positioning of network devices and equipment. There are no marks for descriptions of what is on the diagram. 1 mark per explanation which justifies a positioning decision, to a maximum of 6. 1 mark per explanation which justifies a general network decision, to a maximum of 3 Maximum total of 6. e.g. The Internet Cafe has 6 PCs = 0 The Internet Cafe has 6 PCs so that routine maintenance of a machine will not prevent guests from having Internet access / so that guests are less likely to complain about having to queue for access. = 1 Answers may include: • Server position • Apartments site, router position • Network protection / security measures • Internet Cafe PC numbers	**6**

	• Internet Cafe connection • Internet Cafe security • Internet Cafe location • Water Wonders site, switch position • Expansion provision	**(22)**

Network Diagram. NOTE. This diagram:

- is drawn to illustrate all of the marking points
- is **not** the only answer
- is probably not the best answer



Activity 5 – Network addressing and protocols

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5a</td><td>Required evidence for 5a:
All addresses given must be 192.168.1.X

<table>
<tr><th>Static / dynamic with device</th><th>Justification</th></tr>
<tr><td>(a) Static address for server (1)</td><td>(b) Server runs the system / DHCP so cannot be in DHCP / dynamic (1)</td></tr>
<tr><td>(c)Static address for router (1)</td><td>(d) routers are gateways, addresses must be fixed (1)</td></tr>
<tr><td>(e) Static address for networked printer (1)</td><td>f) e.g. Printer remote admin (1)</td></tr>
<tr><td colspan="2">(g) Static or Dynamic addresses for PCs, with justification (1)</td></tr>
<tr><td>(h) Static for access / payment points (1)</td><td>(i) e.g. remote admin, checking child privileges at each point (1)</td></tr>
<tr><td colspan="2">(j) Static or Dynamic addresses for ticket machines, with justification. (1)</td></tr>
<tr><td colspan="2">(k) Explanation of reservations / scopes / leases in DHCP (1)
Mark may be given as a bonus in any of the above</td></tr>
</table>
1 mark each to a maximum of 8 marks</td><td>8</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5b</td><td>Required evidence for 5b:
Explanation of why having two similar Class C networks will not cause a problem.
Any 5 of:
• both networks are private
• explanation of what private means
• communication uses routers
• routers have public addresses
• the public addresses hide / mask the private ones
• explanation of Network Address Translation being used
Maximum 5 marks</td><td>5</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5c</td><td>Required evidence for 5c:
A list and brief description of some common VoiP features.
Any sensible feature with a description. 1 mark to max of 6
Description indicates a business use, in the context of Water Wonders 1 mark

<table>
<tr><th>Example features</th><th>Example of how it is used in context</th></tr>
<tr><td>voice mail</td><td>To allow messages to be left for the manager if they away from their desk.</td></tr>
<tr><td>text communication and attachments /file sending</td><td>To allow documents to be sent from London – Spain during a video conference call</td></tr>
<tr><td>video communication</td><td>Video conferencing between management in London and Spain</td></tr>
<tr><td>conference / multi-way calls</td><td>Allows all staff at e.g. the bar-cafes to be given instructions at the same time</td></tr>
<tr><td>Call logging</td><td>Enables management to track usage / abusage by staff.</td></tr>
<tr><td>Other sensible X3</td><td>In context</td></tr>
</table>

Maximum 8 marks</td><td>8</td></tr>
<tr><td colspan="2"></td><td>21</td></tr>
</table>

Standard ways of working. 2 Marks

All printouts must have a header and a footer. The header must contain the activity number. The footer must contain your name, candidate number and centre number.

Minimum font size of 10 should be used for all word processed documents.

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