

openStudent

Background Paper

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Executive Summary

We have all heard the old adage "*Those who ignore history are doomed to repeat it*" (**George Santayana**). For the last 25 years we have continually purchased off-the-shelf student information systems with the expectation and belief that they would meet our requirements. In reality, even with extensive customizations, our experience has been that these applications have always fallen short of our individual and collective needs.

The BCeSIS experience and the potential migration to PowerSchool has caused us to reflect on a number of important questions about the future of student information systems in BC. We have challenged ourselves by asking the following questions:

1. We have collectively purchased and implemented numerous information systems over the past several decades. Are any of these commercial applications still viable today?
2. With any of the applications purchased, how much control or input did districts have in the development and the ongoing enhancements of the software? How much control can we reasonably expect to have with future commercial software purchases?
3. With any of the applications purchased, how many have satisfied all of our needs? Is meeting just 80% of our requirements sufficient? We recognize that the nature of the missing 20% of functionality has had a significant impact on day-to-day work. Are we satisfied with this?
4. Is there any commercial software product that can respond rapidly to our changing requirements in British Columbia (i.e. personal learning)?
5. Is there any commercial software product that can satisfy all our needs for an affordable price? Can the ministry and districts sustain these costs into the foreseeable future?
6. Do any of the commercial applications considered or purchased allow us to seamlessly integrate with other district peripheral programs? (i.e. Library systems, fee systems, transportation, attendance callout and so forth)

7. Are we willing to continue being a small fish in a very large pond? For example, if we select Pearson, British Columbia will represent less than 4% of their total student base. Regardless of which vendor is chosen, we face a number of significant risks including the inability to affect change, the vulnerability of the vendor and software, and the long-term affordability of the system. The motivation of any company is to maximize share profits for the benefit of the shareholders, not for the benefit of districts or, ultimately, students. Are we willing to accept these risks again?

Leaders from across the province have pondered these and similar questions for a number of years, particularly at this time of transition from BCeSIS. We believe that the consensus answers to these questions are resoundingly clear. Our reliance on commercial products has not worked. There are no fully viable solutions and those that come even marginally close are prohibitively costly and are a poor fit for our BC context. Thus, it is our firm belief, as it is for many of our colleagues cross the province, that we need to take a different approach.

We know that within the province we have the capability to successfully develop a student information system that will positively address the above questions. We have a vision that represents the knowledge, experience and insights of the breadth and depth of stakeholders in the education sector. This vision includes using established open-source tools and agile methodologies that will engage participation of users at all levels. This approach will ensure the following results:

1. That we will completely meet all requirements of stakeholders around the province.
2. That we will continue to have an enterprise level, and common student information system throughout the province.
3. That we will maintain complete ownership and control of the application at all times.
4. That the non-commercial, non-profit approach will ensure that the system is affordable and sustainable in the long-term and will represent a fraction of the current expenditure level. These savings can be re-directed into student learning and achievement.
5. That we will have complete flexibility to meet the changing requirements of stakeholders in a timely and responsive manner.

The encouraging thing is, it's been done before and continues to prove successful. The Kualu Foundation is an education consortium that has pulled post-secondary stakeholders together from around the world to develop a broad range of information systems for education. (Their motto is ***for higher education, by higher education***). Although they are operating in the post secondary sector, the need for affordability, sustainability, collaboration, stability, functionality, and long-term control mirrors our needs exactly in BC.

The remainder of this paper will further elaborate on the points above. We believe that there is a better way to approach the development, operation and maintenance of a provincial student information system. We encourage you to consider all of the points in this paper and we welcome your questions and feedback.

1 Introduction

Districts and schools from across the country require effective and robust Student Information Systems (SIS) to manage student enrolment, funding, course management, reporting and a myriad of other education and administrative functions. In recent years, there has been significant discussion and research into changing the delivery and assessment approach to learning. These changes will have significant impacts on SIS applications of the future.

The province's current student information system (BCeSIS), and similar systems used in other North American jurisdictions, have been very expensive to implement and to maintain. The architecture of these systems does not allow for diverse functionality to co-exist for the different jurisdictions. This has led to a 'one-size-fits-all' approach to developing and maintaining the application. Due to the proprietary nature of most systems, change requests are often problematic and are otherwise time consuming and expensive to develop. When changes are made, they often take years to implement and are cost prohibitive.

Over the past several years there has been much discussion over the poor performance, lack of functional requirements, lack of flexibility and economic failure of BCeSIS. In response to this, districts met in February 2011 to address their collective concerns. The meeting was attended by over 120 delegates and represented 86.45% of all students in the province. The delegates spent the day identifying and analyzing the strengths, weaknesses, opportunities and threats that exist for districts. The following table highlights the top concerns and opportunities that were identified.

Strengths:	<ul style="list-style-type: none"> ▪ Having a common system ▪ Maintaining standardized data ▪ Web-based Ministry reporting
Weaknesses:	<ul style="list-style-type: none"> ▪ Basic design ▪ Reporting ▪ TA / Grade-book
Opportunities:	<ul style="list-style-type: none"> ▪ Improve functionality ▪ Develop and build a new system ▪ Data warehousing and archiving
Threats:	<ul style="list-style-type: none"> ▪ Pearson Canada's purchase of the common system ▪ Infrastructure issues ▪ Ministry actions regarding the common system

The results of the meeting clearly showed that improving functionality and developing a custom and sustainable information system were top opportunities. In light of this and all other factors, the Saanich School District has decided to take a proactive approach to solving the current SIS issues while building on the successes and lessons learned from the past.

2 Project Definition

The purpose of the project is twofold. The first is to create a consortium of districts from around the province and to create a community of support, collaboration, problem solving and knowledge-sharing related to all technologies and information systems in the K-12 education sector. The working name for this entity is the **Sustainable Education Systems Consortium (SESC)** and will provide a broad range of services to underlying initiatives.

The second purpose is to develop and deliver a sustainable, sophisticated, flexible, and fully integratable Student Information System. It is envisioned that **OpenStudent** will meet the needs of all stakeholders in Elementary, Middle & Secondary schools including administrators, teachers, and clerical personal. The system will also meet the needs of a wide band of other stakeholders including district staff, Ministry staff, DL schools, International schools, alternate schools, IT departments and related educational personnel.

The fundamental premises for the development of this application are as follows:

1. The process of developing the software will be agile in nature and as such will depend on continuous, real-time interaction with stakeholder groups.
2. The development and maintenance of **OpenStudent** will be completely transparent to all stakeholders.
3. The development of **OpenStudent** will utilize the significant resources, common practices and knowledge of the **Sustainable Educational Systems Consortium**; a non-profit body that is made up entirely of education stakeholders.

2.1 Vision

One of the biggest on-going challenges for districts is to have a system that anticipates the changing nature of education. With a move away from grades and percentages, the incorporation of 21st Century Learning, and a move to personalized learning environments, the demand for control, flexibility, and scalability has never been more important. The concern that has been clearly articulated by stakeholders is whether or not a commercial system can adequately accommodate this new paradigm that embraces virtual, online, and remote learning. There is considerable doubt that a commercial application will give regard to important concepts such as the personal learning environment, the importance of community, informal learning, and support for positive human relationships and interactions. It is also critically important that the system is operationally and economically sustainable in the long-term.

It is the intention of the Saanich school district, to lead a consortium of districts in the development of a custom student information system for the province of BC. It is intended that this application will replace BCeSIS, the current enterprise level application in the province. The development process will build on prior successes and will leverage the energy, wisdom and experience of all stakeholder groups around the province. With this agile approach to software development, it is expected that in time, all districts will utilize this application.

OpenStudent will be operated on a **non-profit basis** and will utilize open source tools and techniques. This means that there will be no costly software license fees, no Oracle database license fees, and no markup on the operation and maintenance of the system. This will substantially reduce the costs of operation for all districts. In addition, the development of the application can easily be financed through the savings that districts will enjoy as they move their schools out of BCeSIS and into OpenStudent.

At the root of this recommended approach are the following ideals:

Scalable	To deliver a robust, scalable Student Information System to school districts, independent schools and First Nations schools in BC. It is intended that openStudent will meet the needs of all size and complexity of environments.
Agile Approach	To develop a custom SIS that builds on past successes. The development approach will use Agile methodologies and in doing so, tap into the energy, wisdom and experience of all stakeholder groups around the province.
Strategic	To build a custom SIS that is strategic and meets all current district requirements while fully supporting the vision for 21 st Century and personalized learning,
Community Development	To use a truly collaborative approach for developing the SIS application to ensure that all stakeholder needs are met - now and for the foreseeable future. The system will be 'owned' by all participating stakeholders.
Flexibility	To provide sufficient flexibility to grow with an ever-changing technological environment, changing stakeholder needs, adapting to 21 st Century learning approaches, and the ability to adapt to foreseen and unforeseen risks.
Open Source Licensing	The openStudent application will be distributed under the Education Community License, Version 2.0 . It is critical to develop and operate a student information system that is both affordable and sustainable in the long run.
Transparency	All development, maintenance and governance activities will be open to the consortium and participant community.

2.2 Objectives

The following are key objectives to be completed within the scope of this project.

Business Objectives

1. Develop a common database for all modules that is robust and scalable.
2. Develop modules on the common enterprise platform that will meet all student information requirements including registration, attendance, cross enrolment, marks & curriculum reporting, SPED, internal reporting, Ministry reporting, StrongStart functionality, incidents, teams, fees, transportation, teacher gradebook, timetable building, and diploma verification.
3. Develop specific functionality to meet all requirements for Distance Learning schools.
4. Develop specific functionality to meet all requirements for International schools.
5. Develop specific functionality to meet all requirements for Alternate schools.
6. Form a provincial (or national) consortium of school districts to develop a community of stakeholders to participate directly in the discussion, communication and governance regarding development of OpenStudent and related applications.
7. Provide a flexible platform to meet all current needs, as well as meet emerging requirements for personalized and 21st Century Learning approaches.
8. Develop an environment for education and commercial stakeholders to participate in all activities based on defined standards.
9. Develop a regional support network to provide training, implementation, conversion and L1 services to participating districts.

Technology Objectives

1. Develop a modern and intuitive student information system that will have the flexibility to meet different requirements in a broad range of districts in British Columbia.
2. Develop comprehensive guiding principals for the technical architecture of the system.

3. Develop a distributed, redundant cloud-based hosting service for the province of BC that will have as close to 100% up time as possible.
4. Develop a common API for all applications that fall within the SESC umbrella.
5. Develop a system that has the ability to run different versions of the same module simultaneously to meet differing needs of districts and / or schools.

2.3 Scope

The current plan is to have a fully functioning application for Elementary and Distance Learning schools after Year 1, followed by most functionality for Middle schools after Year 2 and the remaining schools from Years 3 to 5. The following chart summarizes the basic timeline.

Module Name & Description		Elem	DL & Alt	Middle	Secondary
		Year 1	Year 2	Year 3+	
openStudent	Core module	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Homeroom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Attendance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Curric Mark Entry				
	BC Min Reporting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	SPED Light	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Programs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Strong Start	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Teams & Groups	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Reports	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Lockers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Course Functionality	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Course Mark Entry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Incidents	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openFees	Fees	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openTrans	Transportation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openClass	Teacher Module	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openBuilder	Master Timetable	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openReporter	Data Warehouse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openDL	Distance Learning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
openTrax	Diploma / Trax	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
openSPED	SPED Full	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>

2.4 Deliverables

The following are the key project deliverables.

Item	Components	Description
Renovation of existing (closed) school	Renovation of Saanichton Elementary School.	<ul style="list-style-type: none"> a. Refit 3 classrooms to house PM offices, co-location development & a casual lunch / meeting room. b. Utilize existing gymnasium for recreational & team building purposes. c. Develop a server room and related infrastructure.
openStudent	Multi module application to meet requirements of all schools & types.	<ul style="list-style-type: none"> a. openStudent, openFees, openTrans, openClass, openBuilder, openReporter, openDL, openTRAX, openInternational, openAlt, openParent, openSPED
Communications Infrastructure	Develop website and related electronic modules and content to facilitate interactive communications during, and after project implementation.	<p>Develop a website with the following attributes:</p> <ul style="list-style-type: none"> a. Functionality for social networking tools including Twitter, Instant Messaging, Forums, etc. b. Functionality for posting & categorizing knowledge base materials. Needs to be fully searchable. c. Functionality for static web site materials. Needs to have ease of content management by a variety of project staff. d. Functionality for tagging and connecting all bits of information (chats, forum posts, knowledge base posts, etc. to Agile backlog items).
Agile Education Systems Consortium	Development of a Consortium of Districts to build community and govern OpenStudent & related projects	<ul style="list-style-type: none"> a. Create a British Columbia non-profit society. b. Obtain national charitable status to provide the structure to accept and tax-receipt donations. c. Create a governance agreement that sets forth the mission, terms and fee structure for participating in the consortium. d. Create other documentation and agreements etc. that define the processes for creating & maintaining common tools, help desk services, implementation & conversion services, and other related shared services. e. Create the documentation and agreements, etc. to govern the scope and participation of commercial organisations.

3 Project Organisation

3.1 Stakeholders

OpenStudent has a broad range of large stakeholder groups throughout the province, and potentially throughout the education community.

Stakeholder	Interested in	Representative
Superintendents, Associate Superintendents, District Principals.	Alignment with district vision and strategy. Long term flexibility and sustainability. Alignment with school reporting & analysis needs. FOIPPA concerns.	BC School Superintendents Association (BCSSA). Individual representatives from districts.
Secretary Treasurers	Alignment with district budget. Long term sustainability. FOIPPA concerns.	BC School District Association of Business Officials (BCASBO). Individual representatives from districts.
School Principals / Vice Principals	Alignment with school reporting & analysis needs. Ease of staff training. Consistent up-time. FOIPPA concerns.	BC Principals & Vice Principals Association (BCPVPA). Individual representatives from districts.
District & Clerical staff	Ease of navigation & uses, consistent high performance, consistent continuous up-time, lack of redundancy, compactness, direct connection to business processes. FOIPPA concerns.	Canadian Union of Public Employees (CUPE). Individual representatives from schools. Other grass roots groups.
School Teachers	Comprehensive gradebook and reporting functionality. Flexibility of marking & assessment schemes. Ease of training. Consistent up-time. FOIPPA concerns.	BC Teachers' Federation (BCTF). Individual representatives from schools.
District IT Staff	Alignment with district IT strategy. Long-term flexibility, supportability & sustainability. Ease of conversion, implementation and training. FOIPPA concerns.	Educational Technology Managers Association (ETMA)
Provincial Ministry	Alignment with provincial vision and strategy. Long-term sustainability & flexibility. Consistent and ease of data reporting from districts. Ability to complete high level analysis and reporting. FOIPPA concerns.	BC Ministry of Education.
Parents of Students	Access to student achievement and attendance information. FOIPPA concerns.	Parent Advisory Councils. District Parent Advisory Councils. Individual representatives.
District Board of Trustees	Long-term financial sustainability. High level reporting & analysis. FOIPPA concerns.	British Columbia School Trustees Association (BCSTA).
Provincial MLA	Long-term financial sustainability. FOIPPA concerns.	Provincial Legislature.
Commercial Partners & Vendors	Opportunity to add value.	Various technical & business related associations.

4 Project Plan Highlights

4.1 Approach

The following is a brief summary as to the approach that will be taken to develop OpenStudent.

Phase	Approach
Initiation	The project has been initiated through joint and collaborative efforts of the Business Sponsors, Technical Sponsor and the Project Manager. A Business case & vision paper has been completed and has been presented to a number of districts around the province. As part of the initiation, numerous other presentations are planned for individual districts and at conferences to communicate the nature, development process and economics of the project.
Planning	The development of OpenStudent will utilize Agile project management and software development methodologies. Agile Development with Scrum is an approach that uses an iterative and incremental approach to software development and project management. The essence of this approach is to incorporate iteration and continuous feedback in order to successively refine and develop an application. The approach involves continuous planning, continuous testing, continuous integration, and other forms of continuous evolution of both the project and the software. Agile is lightweight and inherently adaptable. Just as important, this approach focuses on empowering people to collaborate and make decisions together quickly and effectively.
Execution	Scrum is best used for complex work in which it is largely impossible to predict everything that will occur. This describes the development of a student information system (the task at hand) very well. The traditional approach to this type of endeavour is basically deterministic and utilizes detailed plans, Gantt charts, work schedules and the like. Scrum is the exact opposite. The approach guides the process along in an optimal course which unfolds as the project proceeds. For this reason, the planning for the project begins with high level 'guidelines', and is progressively elaborated throughout the process.
Closure	The close of the project will be evidenced by the completed, tested and accepted application by all related stakeholders.

4.2 Licensing

Licensing is an important consideration for the building of software with the potential scope and range of products being proposed. Therefore, all core modules and supplemental applications created under the SESC mandate will utilize the Education Community License, Version 2.0 (ECL-2.0). The ECL License is a modified version of the Apache license specifically designed for the education and academic community. This ensures the open source nature and non-commercialization of all products within the scope of SESC created applications.

4.3 Non Profit and Sustainable

A critical component to the openStudent project is the development of a non-profit consortium. The non-profit approach to the development, operation and maintenance of the system will reduce costs substantially as compared to historical approaches taken with education information systems. This will also ensure the long-term sustainability of the system and free up resources that can be re-directed towards education and student achievement.

4.4 Analysis of Development & Operating Costs for openStudent

Current annual operating costs of BCeSIS	\$20 / fte	\$13.0 million
<i>(Includes vendor (AAL/Pearson) licensing, Oracle licensing, Fujitsu costs, Fusepoint costs)</i>	<i>Districts pay \$10 / fte, Ministry pays \$10 / fte</i>	<i>(Estimated based on a 650,000 fte)</i>
Estimated annual operating costs of openStudent	\$ 5 / fte	\$ 3.25 million
<i>(Zero vendor licensing, zero Oracle licensing, shared hosting costs with no commercial markup)</i>	<i>Includes shared hosting & maintenance costs</i>	
Annual Savings	\$15 / fte	\$ 9.75 million
	<i>Districts save \$ 5 / fte Ministry saves \$10 / fte</i>	
Total 5 Year Savings		\$ 48.75 million
Total estimated development costs of openStudent (5 years)	\$ 13 / fte	\$ 8.2 million
Payback Period		
<i>If Districts pay for development (with savings)</i>	2.6 years	
<i>If Districts and Ministry pay for development (with savings)</i>	Less than 1 year	

4.5 Risks

The following is a summary of the current major risks to the successful completion of the project. Other risks will be continually identified and resolved during the daily scrum meetings.

Risk	Description	Strategy
Technical Risk	The key risk in this area relates to utilizing leading edge technologies.	The essence of the project will be technical excellence. The technologies required to build a web-based enterprise SIS are well known and documented.
Risk of a mandated SIS	If the Ministry were to mandate a SIS solution it would render this project meaningless.	It is extremely important that all senior district staff and other stakeholders provide leadership and promote the idea that the long-term SIS solution logically belongs within the domain and control of districts.
Risk of inadequate resources	Although much more cost effective than the current model, the OpenStudent project will require adequate funding for the next 5 years and beyond.	A key element to managing this project will be the continuous communication to all districts regarding progress, requirements, operational concerns, etc. It is anticipated that this will attract the vast majority of districts to the effort.

4.6 The Kualii Project

The Kualii project is an excellent example of how the North American post-secondary education community has pulled together to overcome the extraordinary IT challenges related to the budget, functionality and sustainability of core applications. To do this, they have created a Foundation, which provides common services such as project management, implementation, infrastructure and support to participant colleges and universities. These efforts have unified and/or initiated a number of key strategic software development projects including applications for Finance & Accounting (ERP), Student Information, Library and Research.

***Kualii** is a growing community of universities, colleges, businesses, and other organizations partnering to build and sustain open-source software for higher education, by higher education. The members of the Kualii Community share a common vision - open, modular, and distributed systems. Kualii software is released under the Educational Community License.*

*The Kualii Community has sub-communities who collaborate on enterprise software systems, including Kualii Financial System (KFS), Kualii Coeus (KC) for research administration, and Kualii Student (KS). In early 2009, Kualii Rice was added to this portfolio as a fully funded project to evolve a middleware infrastructure common to the other Kualii software. Late 2009 brought the Kualii Open Library Environment (OLE) and the Kualii Ready projects on board. The two newest projects are Kualii People Management for Enterprise (KPME), and Kualii Mobility (KMobility). (**Kualii.org website 2011**)*

At the heart of the Kualu community is a set of values that has been critical to the success of the Foundation and to the development of their applications. These core values include open source licensing, community source development, collaboration across disparate schools and participants, transparency, scalability and modularity. The overall result from this has been extraordinary success with their development projects. By working together, they have met or exceeded the functionality requirements of stakeholders. Moreover, they have done this at a fraction of the cost of going with traditional external vendors and commercial software. They are truly meeting their ideal of developing applications for higher education, by higher education.

5 Conclusion

Over the past several decades, districts across the province of BC have tried numerous commercial student information systems and peripheral applications. Historically, these applications have fallen short of stakeholders' functionality requirements and have been expensive to operate and maintain. With BCeSIS, there has been some measure of success, particularly related to having a common enterprise system and common business practices. At the same time, the system has proven to be inflexible, has significant performance issues, does not interoperate with other key school applications and is prohibitively expensive.

Districts and the Ministry of Education are currently faced with critical decisions regarding the choice and direction of Student Information Systems in BC. We believe that we have an extraordinary opportunity to make a clear choice to do things differently in order to ensure a viable and sustainable solution for the future. The approach put forth in this paper recommends tools and methodologies that have reached maturity and have enjoyed considerable success in both the private and public sector. The Kualu project is a clear testament to this and will provide guidance and confidence for moving forward.

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